EDUCATION RESEARCH GRANTS

CFDA NUMBER: 84.305

RELEASE DATE: April 7, 2006

REQUEST FOR APPLICATIONS NUMBER: IES-NCER-2007-01

INSTITUTE OF EDUCATION SCIENCES
http://ies.ed.gov

LETTER OF INTENT RECEIPT DATE:　　　　　　**June 1, 2006 and September 14, 2006**

APPLICATION TRANSMITTAL DEADLINE:　　　　**July 27, 2006 and November 16, 2006**

THIS REQUEST FOR APPLICATIONS CONTAINS THE FOLLOWING INFORMATION:

PART IV REQUIREMENTS FOR PROPOSED RESEARCH

PART V GENERAL SUBMISSION AND REVIEW INFORMATION

PART I GUIDE TO THE RFA

IES is presenting grant opportunities in a new format this year. To make it as easy as possible and less time consuming for the reader/applicant, this section identifies the major differences from last year's format and describes the consequent organization of information in this year's three (3) Requests For Applications (RFA's).

In FY2006, the Institute of Education Sciences (IES) held a larger number of formal grant competitions, each one addressing a distinct topic area and each with its own RFA. For example, there were separate RFA's for Reading and Writing, Mathematics and Science Education, etc. Both the National Center for Education Research (NCER) and the National Center for Special Education Research (NCSER) offered multiple, single-topic competitions. The National Center for Education Statistics (NCES) also offered a National Assessment of Educational Progress (NAEP) secondary analyses grant competition last year.

In FY2007, IES is holding fewer formal grant competitions but addressing more topics. There are three competitions: one addressing education research (through NCER); one addressing special education research (through NCSER); and one addressing NAEP secondary analyses (through NCES). The education and special education competitions each encompass multiple, specific topic areas.

Last year each topic-specific RFA was self-contained. This year the NCER and NCSER RFA's are organized into sections that contain information that is common to all topics and sections that contain topic-specific information. The NAEP RFA remains self-contained.

This RFA (IES-NCER-2007-01) describes the education research competition. There are eleven (11) separate topics described in this RFA. Applications for three (3) of these topics have an application transmittal deadline of July 27, 2006, and will be reviewed in the fall of 2006. Applications for four (4) topics have an application transmittal deadline of November 16, 2006, and will be reviewed in the late winter (February or March) of 2007. Applications for the remaining four (4) topics applications may be submitted at either of the two transmittal deadlines (July 27 or November 16, 2006), and will be reviewed at both times.

Also new this year are the forms for submitting applications electronically. Highlights of the forms will be available on the web no later than April 11, 2006.

Information on special education research topics may be found in the IES-NCSER-2007-01 RFA, and information on NAEP secondary analyses may be found in the IES-NCES-2007-01 RFA. Topic-specific application transmittal deadlines are specified within these RFA's as well (note, there is only one "topic" and transmittal date for the NAEP RFA).

Suggested options for reading this RFA:

You may download the entire RFA as a .PDF file or you can navigate to particular sections of the RFA on line.

We suggest that prospective applicants begin by reading Parts I & II (introductory sections), followed by Part IV (common information on research Goals One through Four for all topics); then read Part III

(topic-specific information, including information on research goal Five), and finally Part V (common application and submission information for all topics). Again, notice the differing application transmittal deadlines by topic. Also, pay careful attention to the differing requirements for the five research goals in general. There is a decision tree provided in Part IV to help confirm which goal is appropriate for your application. In addition, in this RFA, detailed goal-related requirements are included in the topic-specific sections.

Of course, this RFA may be read start to finish, or you may want to start with a specific topic of interest (topic-specific sections are shown in the RFA table of contents that precedes this guide).

PART II GENERAL OVERVIEW

1. REQUEST FOR APPLICATIONS

In this announcement, the Institute of Education Sciences (Institute) describes the research and postdoctoral research training programs that are funded through its National Center for Education Research. Separate announcements are available on the Institute's website that pertain to discretionary grant competitions funded through the Institute's National Center for Special Education Research (http://ies.ed.gov/ncser) and National Center for Education Statistics (http://nces.ed.gov/).

The Institute invites applications for research projects that will contribute to its education research programs in Reading and Writing; Mathematics and Science Education; Teacher Quality; Education Leadership; Education Policy, Finance, and Management; Interventions for Struggling Adolescent and Adult Readers; Cognition and Student Learning; High School Reform; and Postsecondary Education. In addition, the Institute invites applications to the Postdoctoral Research Training grant program. For the FY 2007 competition, the Institute will consider only applications that meet the requirements outlined below under the sections on Topics with July 27, 2006 Transmittal Deadline; Topics with November 16, 2006 Transmittal Deadline; and Requirements of the Proposed Research.

2. OVERVIEW OF THE INSTITUTE'S RESEARCH PROGRAMS

The Institute's over-arching priority is research that contributes to improved academic achievement for all students, and particularly for those whose education prospects are hindered by inadequate education services and conditions associated with poverty, race/ethnicity, limited English proficiency, disability, and family circumstance.

With academic achievement as the major priority, the Institute focuses on outcomes that differ by periods of education. In the infancy and preschool period, the outcomes of interest are those that enhance readiness for schooling, for example, language skills, and for infants and toddlers with disabilities, developmental outcomes. In kindergarten through 12th grade, the core academic outcomes of reading and writing (including reading and writing in the disciplines), mathematics, and science are emphasized, as well as the behaviors and social skills that support learning in school and successful transitions to employment, independent living, and post-secondary education. At the post-secondary level, the focus is on enrollment in and completion of programs that prepare students for successful careers and lives. The same outcomes are emphasized for students with disabilities across each of these periods, and include the functional outcomes that improve educational and transitional results. The acquisition of basic skills by adults with low levels of education is also a priority.

In conducting research on academic outcomes, the Institute concentrates on conditions within the control of the education system, with the aim of identifying, developing, and validating effective education programs, practices, policies, and approaches as well as understanding the factors that influence variation in their effectiveness such as implementation. Conditions that are of highest priority to the Institute are in the areas of curriculum, instruction, assessment (including the identification of students with disabilities), the quality of the education workforce, and the systems and policies that affect these conditions and their interrelationships (for example, accountability systems, delivery mechanisms including technology, and policies that support the ability of parents to improve educational results for

their children through such means as choice of education services and provision of school-related learning opportunities in the home).

In this section, the Institute describes the overall framework for its research grant programs. Specific information on the research topics described in this announcement may be found in the sections pertaining to each education research program:
- Reading and Writing
- Interventions for Struggling Adolescent and Adult Readers and Writers
- Mathematics and Science Education
- Teacher Quality
- Education Policy, Finance, and Systems
- Education Leadership
- Cognition and Student Learning
- High School Reform
- Postsecondary Education
- Postdoctoral Research Training

The Institute addresses the educational needs of typically developing students through its Education Research programs and the needs of students with disabilities through its Special Education Research programs. Both the Education Research and the Special Education Research programs are organized by outcomes (e.g., reading, mathematics), type of education condition (e.g., curriculum and instruction; teacher quality; administration, systems, and policy), grade level, and research goals.

A. Outcomes
The Institute's research programs focus on improvement of the following education outcomes: (a) readiness for schooling (pre-reading, pre-writing, early mathematics and science knowledge and skills, and social development); (b) academic outcomes in reading, writing, mathematics, and science; (c) student behavior and social interactions within schools that affect the learning of academic content; (d) skills that support independent living for students with significant disabilities; and (e) educational attainment (high school graduation, enrollment in and completion of post-secondary education).

B. Conditions
In general, each of the Institute's research programs focuses on a particular type of condition (e.g., curriculum and instruction) that may affect one or more of the outcomes listed previously (e.g., reading). The Institute's research programs are listed below according to the primary condition that is the focus of the program.

a. *Curriculum and instruction*. Several of the Institute's programs focus on the development and evaluation of curricula and instructional approaches. These programs include: (a) Research on Reading and Writing; (b) Research on Mathematics and Science Education; (c) Research on Preschool Curriculum Evaluation; (d) Research on Social and Character Development; (e) Early Intervention, Early Childhood Special Education, and Assessment for Young Children with Disabilities; (f) Mathematics and Science Special Education Research; (g) Reading, Writing, and Language Development Special Education Research; (h) Secondary and Transition Services Special Education Research; (i) Serious Behavior Disorders Special Education Research; (j) Autism Spectrum Disorders; and (k) Response to Intervention.

b. *Quality of the Education Workforce*. A second condition that affects student learning and achievement is the quality of teachers and education leaders (e.g., principals, superintendents). The Institute funds research on how to improve teacher quality through its programs on (a) Research on Teacher Quality (b) Research on Education Leadership; and (c) Research Grants Program on the Quality of Teachers and Other Service Providers for Students with Disabilities.

c. *Administration, systems, and policy*. A third approach to improving student outcomes is to identify systemic changes in the ways in which schools and districts are led, organized, managed, and operated that may be directly or indirectly linked to student outcomes. The Institute takes this approach in its programs on (a) Research on Education Policy, Finance, and Systems; (b) Education Research on High School Reform; (c) Special Education Research on Individualized Education Programs and Individualized Family Service Plans; and (d) National Assessment of Educational Progress (NAEP) Secondary Analysis Research Program.

Applicants should be aware that some of the Institute's programs cover multiple conditions. For example, the following programs cover multiple conditions: (a) Research on Cognition and Student Learning; (b) Research on High School Reform; and (c) Special Education Research on Individualized Education Programs and Individualized Family Service Plans. In addition, the NAEP Secondary Analysis program funds projects that cut across conditions (programs, practices, and policies) and types of students (regular education and special education students).

C. Grade Levels
The Institute's research programs also specify the ages or grade levels covered in the research program. The specific grades vary across research programs and within each research program, and grades may vary across the research goals. In general, the Institute supports research for (a) pre-kindergarten and kindergarten, (b) elementary school, (c) middle school, (d) high school, (e) post-secondary education, (f) vocational education, and (g) adult education. In addition, the Institute supports research on infants with disabilities.

D. Research Goals
The Institute has established five research goals for its research programs. Within each research program one or more of the goals may apply: (a) Goal One – identify existing programs, practices, and policies that may have an impact on student outcomes and the factors that may mediate or moderate the effects of these programs, practices, and policies; (b) Goal Two – develop programs, practices, and policies that are theoretically and empirically based and obtain preliminary (pilot) data on the relation (association) between implementation of the program, practice, or policy and the intended education outcomes; (c) Goal Three – establish the efficacy of fully developed programs, practices, or policies that either have evidence of a positive correlation between implementation of the intervention and education outcomes *or* are widely used but have not been rigorously evaluated; (d) Goal Four – provide evidence on the effectiveness of programs, practices, and policies implemented at scale; and (e) Goal Five – develop or validate data and measurement systems and tools.

For a list of the Institute's FY 2007 research grant topics – including research grant competitions through the Institute's National Center for Education Research, National Center for Special Education Research, and National Center for Education Statistics, please see Table 1 below. This list includes the

Postdoctoral Research Training Fellowships in the Education Sciences, which is not a research grant program. Funding announcements for these competitions may be downloaded from the Institute's website at http://ies.ed.gov.

Table 1: FY 2007 Research Grant Topics:

Education Research on

1   Reading and Writing
2   Interventions for Struggling Adolescent and Adult Readers and Writers
3   Mathematics and Science Education
4   Teacher Quality – Reading and Writing
5   Teacher Quality – Mathematics and Science Education
6   Education Leadership
7   Education Policy, Finance, and Systems
8   Cognition and Student Learning
9   High School Reform
10   Postsecondary Education
11   Research Training Grants

Special Education Research on

12   Early Intervention, Early Childhood Special Education, and Assessment for Young Children
        with Disabilities
13   Individualized Education Programs and Individualized Family Service Plans
14   Mathematics and Science Education
15   Reading, Writing, and Language Development
16   Secondary and Transition Services
17   Serious Behavior Disorders
18   Quality of Teachers and Other Service Providers for Students with Disabilities
19   Autism Spectrum Disorders
20   Response to Intervention
21   Assessment for Accountability

National Assessment of Education Progress

22   Secondary Analysis of Data from the National Assessment of Educational Progress

PART III RESEARCH GRANT TOPICS

For the Institute's FY 2007 research grant programs, there are two sets of topics; one set has a transmittal deadline of July 27, 2006, and the other has a transmittal deadline of November 16, 2006. In this section, the Institute first describes the topics for the July 2006, transmittal deadline, followed by the topics for the November, 2006 transmittal deadline.

3. TOPICS WITH JULY 27, 2006 TRANSMITTAL DEADLINE

A. Research on Reading and Writing

Through its Research on Reading and Writing (Read/Write) grants program, the Institute intends to contribute to improvement of reading and writing skills by (1) identifying curriculum and instructional practices that are associated with better reading or writing outcomes as well as mediators and moderators of the relations between these practices and student outcomes; (2) developing new curricula or instructional approaches for teaching individuals reading, pre-reading, writing, or pre-writing skills or for addressing the underlying causes of reading or writing difficulties (e.g., poor oral language skills); (3) evaluating fully developed curricula or instructional approaches for teaching reading, pre-reading, writing, or pre-writing skills or for reducing/preventing reading or writing difficulties through efficacy or replication trials; (4) evaluating the effectiveness of curricula or instructional approaches for teaching reading, pre-reading, writing, or pre-writing skills that are implemented at scale; and (5) developing and validating assessments that can be used in instructional settings to identify sources of reading and writing difficulties. The long-term outcome of this program will be an array of tools and strategies (e.g., assessments, instructional approaches) that have been documented to be effective for improving reading and writing.

a. *Background*. Too many students are unable to understand what they read. According to the 2005 National Assessment of Educational Progress (NAEP), 36 percent of fourth graders and 27 percent of eighth graders cannot read at the basic level; and on the 2002 NAEP 26 percent of twelfth graders cannot read at the basic level. That is, when reading grade appropriate text these students cannot extract the general meaning or make obvious connections between the text and their own experiences or make simple inferences from the text. In other words, they cannot understand what they have read. By fourth grade, students are expected to learn new information by reading subject matter textbooks (Chall, 1996). Poor reading skills may hinder students' progress in learning academic content in all areas.

A similar picture emerges in the development of writing skills. According to the 2002 NAEP writing assessment 14 percent of fourth graders cannot write at the basic level, 15 percent of eighth graders cannot write at the basic level, and 26 percent of twelfth graders cannot write at the basic level.

Although tremendous advances have been made in understanding how children learn to read, we have less systematic knowledge about how individuals become proficient readers or proficient writers. There is subsequently less agreement as to what a teacher can or should do to cultivate active, engaged, and proficient readers and writers.

The Institute intends for the FY 2007 Reading and Writing program to focus on curricula, instructional approaches, and assessments designed to support the development of proficient readers and writers from pre-kindergarten through high school. On the 2005 NAEP, only 32 percent of fourth graders were

reading at the proficient level or advanced levels, and only 31 percent of eighth graders were at the proficient or advanced levels. On the 2002 NAEP, 36 percent of twelfth graders were at the proficient or advanced levels. On the 2002 NAEP, 28 percent of fourth graders, 31 percent of eighth graders, and 24 percent of twelfth graders were writing at the proficient or advanced levels.

b. ***Specific requirements for applications submitted to the Read/Write topic***. The Institute is particularly interested in interventions for students who are from low-income backgrounds and/or racial, ethnic, and linguistic minority groups that have underachieved academically, but will consider applications that focus on other populations if the results are likely to be applicable across socio-economic and racial, ethnic, and linguistic categories.

Interventions that are appropriate for the Reading and Writing program are reading or writing curricula and instructional approaches that could be implemented within the context of an existing reading or writing curriculum. Curricula and instructional approaches that are appropriate for the Reading and Writing program are those that are designed for typically developing students. Researchers who are interested in proposing to develop or evaluate curricula or instructional approaches targeting struggling adolescent or adult readers or writers should apply to the Interventions for Struggling Adolescent and Adult Readers and Writers program.

Individuals who are interested in conducting research on interventions for students with disabilities should refer to the Institute's **Reading, Writing, and Language Development Special Education Research Grants Program and Early Intervention, Early Childhood Special Education, and Assessments for Young Children with Disabilities Special Education Research Program** (http://ies.ed.gov/ncser). For these programs, the term "students with disabilities" is defined as in the Individuals with Disabilities Education Act, as a child "(i) with mental retardation, hearing impairments (including deafness), speech or language impairments, visual impairments (including blindness), serious emotional disturbance (referred to in this title as 'emotional disturbance'), orthopedic impairments, autism, traumatic brain injury, other health impairments, or specific learning disabilities; and (ii) who, by reason thereof, needs special education and related services." (Part A, Sec. 602)

For the FY 2007 Read/Write program, applicants must submit under *either* Goal One *or* Goal Two *or* Goal Three *or* Goal Four *or* Goal Five. More details on the requirements for each goal are listed in the section on General Requirements of the Proposed Research. In this section, specific requirements that apply to applications to the Read/Write topic are described.

(i)   Goal One incorporates efforts to identify curricula and instructional approaches that are associated with better student achievement in reading and writing. The understanding developed through Goal One awards is expected to be relevant to the design and implementation of future interventions. The typical methodology for Goal One will be the analysis of existing databases, including state longitudinal databases, using statistical approaches that allow for testing models of the relationships among variables in ways that strengthen hypotheses about paths of influence. More details on the requirements for applications submitted under Goal One are described in the Goal One sub-section of the General Requirements of the Proposed Research section. For the Read/Write topic, Goal One is limited to pre-kindergarten through high school.

(ii)   Applicants proposing to develop new curricula or instructional approaches should apply under
        Goal Two. Also allowable under Goal Two are applications to obtain preliminary student
        outcome data on the correlation between exposure to an intervention and reading or writing
        performance for fully developed curricula or instructional approaches that have not previously
        been evaluated with student outcome data. Under Goal Three, the Institute will accept proposals
        to conduct efficacy or replication trials of reading or writing curricula or instructional
        approaches. Goal Four targets evaluations of the effectiveness of curricula or instructional
        approaches implemented at scale. The second through fourth goals can be seen as a progression
        from development (Goal Two) to efficacy (Goal Three), to effectiveness at scale (Goal Four).
        Additional requirements for applications submitted under Goal Two, Three, or Four are
        described in the Goal Two, Goal Three, and Goal Four sub-sections of the General Requirements
        of the Proposed Research section.

        Applicants proposing to develop or evaluate *reading, pre-reading, writing, or pre-writing*
        interventions (i.e., Goals 2-4) must target students at any level from pre-kindergarten to high
        school. Reading and pre-reading interventions appropriate for this topic are those intended to
        support the development of proficient readers among typically developing students (i.e., students
        who do not have disabilities and who do not qualify for services under the Individuals with
        Disabilities Education Act). Writing or pre-writing interventions must be for teaching basic
        writing skills and not, for example, creative writing skills.

(iii)   Under the Read/Write topic, Goal Five addresses the need to develop and validate reading and
        writing measurement tools for classroom assessments to be used for instructional purposes (e.g.,
        progress monitoring). To improve reading and writing skills, instruction may need to be tailored
        to the sources of difficulty that individual students experience. An ideal learning environment
        might involve regular and frequent assessment of skills and the possibility of individualized
        instruction for students based on the particular source of their difficulties. Through Goal Five,
        the Institute intends to support the development of diagnostic assessments in reading and writing
        and assessments to monitor progress in reading and writing.

        (1)   *Requirements of proposed assessments*. Applicants under Goal Five should propose to
               develop assessments that can be used in education delivery settings to identify sources of
               reading or writing difficulty in students from pre-kindergarten through post-secondary,
               vocational education, and adult education or to monitor progress in reading or writing for
               instructional purposes. Applications that would be appropriate for consideration under
               Goal Five include, but are not limited to: (a) proposals to develop new assessments that
               teachers could use to inform classroom instruction; (b) proposals to modify or adapt
               existing assessments so that teachers can use them to inform daily or weekly instructional
               plans for specific students; and (c) proposals to adapt assessments originally designed and
               used for research purposes for broader use in instructional settings.

               Applicants should provide a compelling rationale to support the development of the
               proposed assessment. Reviewers will consider the strength of the theoretical foundation
               for the proposed assessment, the existing empirical evidence supporting the proposed
               assessment, and whether the proposed assessment duplicates existing reading
               assessments. Applicants should clearly describe the components of the assessment (e.g.,

specific knowledge and skills that the instrument is designed to tap). When applicants clearly describe the components of the assessment, reviewers are better able to evaluate the relation between the theoretical and empirical foundation for the assessment and the assessment itself (e.g., does the proposed assessment capture critical skills?), and whether the proposed assessment will meet the needs for which it is intended.

In developing these assessments, researchers should keep in mind the pragmatic constraints (e.g., number of students, limited class time, time required to train teachers to use the assessments, costs) that teachers and administrators will consider to determine whether the instrument is a viable option for use in classrooms and other education delivery settings. Applications should provide sufficient description of the proposed assessment and how it could be utilized within education delivery settings for reviewers to judge the practicality of the proposed assessment for instructional purposes.

By describing the theoretical and empirical support for the proposed assessment, the practical utility of the assessment, and the components of the assessment, applicants are addressing aspects of the significance of their proposal.

(2)   *Methodological requirements*. There are two aspects of the research methodology that applicants must clearly address: (a) the proposed methods for developing the assessment and (b) the proposed research methods for obtaining evidence of the *validity and reliability* of the instrument.

Applicants should describe the process they will use to collect empirical (but not necessarily experimental) data that will provide feedback for refining specific components of the assessment. As an example, suppose an applicant proposes to develop a progress monitoring assessment for middle school teachers to use. As part of the development process, the applicant might propose to obtain feedback from students and teachers on initial and revised versions of the assessment. For example, after middle school students have completed an assessment, the researchers might probe students to see if, for example, they are interpreting questions in the way that the researchers intend for the questions to be understood. In addition, the researchers could propose to interview or conduct focus groups with teachers who pilot the initial and revised versions of the instrument to obtain feedback on feasibility of implementation, difficulties encountered, and possible suggestions for improving the materials. *Applicants should describe the iterative development process to be used in the design and refinement of the proposed measurement tool.*

Applicants should detail the proposed procedures for determining which reading difficulties are being "tapped" by the instrument (i.e., construct validity); selecting items to be used in the assessment; assessing difficulty of selected items; and obtaining representative responses to items. Applicants should clearly describe the research plans for determining the validity and reliability of the instrument. Applicants should describe the characteristics and size of samples to be used in each study, procedures for collecting data, measures to be used, and data analytic strategies.

(3)   *Personnel and resources*. Competitive applicants will have research teams that collectively demonstrate expertise in (a) reading and/or writing; (b) assessment; (c) implementation of, and analysis of results from, the research design that will be employed; and (d) working with teachers, schools, or other education delivery settings in which the proposed assessment might be used. Competitive applicants will have access to institutional resources that adequately support research activities and access to schools in which to conduct the research.

(4)   *Awards*. Typical awards under Goal Five will be $150,000 to $400,000 (total cost = direct + indirect costs) per year for up to 4 years. Larger budgets will be considered if a compelling case can be made for such support. The size of award depends on the scope of the project.

B. Mathematics and Science Education

The Institute intends for the research program on Mathematics and Science Education (Math/Science) to fulfill five goals: (1) identifying curriculum and instructional practices that are associated with better mathematics or science outcomes, as well as mediators and moderators of the relations between these practices and student outcomes; (2) developing new curricula and instructional approaches to mathematics and science education that will eventually result in improving mathematics and science achievement; (3) establishing the efficacy of fully developed curricula and instructional approaches to mathematics and science education with small efficacy or replication trials; (4) providing evidence on the effectiveness of mathematics and science curricula and instructional approaches implemented at scale; and (5) developing and validating assessments for diagnosing sources of mathematics difficulties. The long-term outcome of this program will be an array of tools and strategies (e.g., curricula, programs) that have been demonstrated to be effective for improving mathematics and science learning and achievement.

a. *Background*. Current levels of mathematics and science achievement at the elementary and secondary levels suggest that the United States is neither preparing the general population with levels of mathematics and science knowledge necessary for the 21st century workplace, nor producing an adequate pipeline to meet national needs for domestic scientists and mathematicians. In the 2000 National Assessment of Educational Progress (NAEP), only two percent of U.S. students attained advanced levels of mathematics or science achievement by Grade 12. In mathematics, large numbers of U.S. students continue to score below the basic level. In the 2005 NAEP, 20 percent of Grade 4 students and 31 percent of Grade 8 students scored below the "basic" level. In the 2000 NAEP, the most recent assessment of Grade 12 students, 35 percent of grade 12 students scored below the "basic" level. At Grade 4 scoring below the basic level means that the student is likely to miss problems such as using a ruler to find the total length of three line segments. At Grade 12 scoring below the basic level means that the student is unlikely to be able to solve problems such as finding the perimeter of a figure. Despite the fact that levels of mathematics achievement have improved over the past decade, achievement gaps remain wide with low levels of achievement being more likely among minority groups and students from low-income backgrounds

As in mathematics, many U.S. students are not attaining mastery of rudimentary science knowledge and skills. In the 2000 NAEP, 34 percent of Grade 4 students**,** 39 percent of Grade 8 students, and 47 percent of Grade 12 students scored below the "basic" level in science. At Grade 4, students performing

below the basic level cannot read simple graphs. At Grade 12, students performing below the basic level are likely to miss problems such as drawing a simple diagram of the solar system. On the 2000 NAEP, only 22 percent of all Grade 12 students demonstrated knowledge of the essential features and function of genes – that is, that genes determine our individual characteristics and are made up of strands of DNA. As in mathematics, low levels of achievement are more likely among minority groups and students from low-income backgrounds.

In recent years there has been much disagreement about how to improve mathematics and science education in order to raise achievement levels. At issue in mathematics education are fundamentals such as what constitutes mathematics proficiency and which teaching methods support student achievement of this proficiency. Although there has been much debate, very little empirical research has been conducted to determine if one approach or another or some combination of approaches leads to improved mathematics achievement across ethnic, racial, and socioeconomic groups in our country. In science education there has been more agreement about what to teach but there are disagreements about the time and place for hands-on learning. Very little empirical evidence has accumulated showing the effectiveness of particular science curricula or approaches to teaching science.

In addition, despite the bodies of research in the cognitive sciences that identify basic principles of knowledge acquisition and memory, elaborate distinct differences in the ways that experts and novices organize and use information, and describe the development of general cognitive processes critical to scientific thinking, it is not evident that curricula and approaches to instruction in mathematics and the sciences have incorporated findings from this accumulation of research. The Institute strongly encourages those who propose to develop new curricula or instructional approaches to build on this knowledge base (e.g., Anderson, Reder, & Simon, 2000; Carver & Klahr, 2001).

Finally, little work has been conducted to evaluate the effectiveness of mathematics and science curricula and instructional practice for improving student learning and achievement. To address the need to improve mathematics and science education in our country, the Institute seeks to fund applications that address the development or evaluation of mathematics or science curricula and instructional approaches.

b. *Specific requirements for applications submitted to the Math/Science topic*. Under the Math/Science topic, the Institute is particularly interested in curricula and instructional approaches for students who are from low-income backgrounds and/or racial, ethnic, and linguistic minority groups that have underachieved academically, but will consider applications that focus on other populations if the results are likely to be applicable across socio-economic and racial, ethnic, and linguistic categories.

Individuals who are interested in conducting research on interventions for students with disabilities should refer to the Institute's **Mathematics and Science Special Education Research Program and Early Intervention, Early Childhood Special Education, and Assessments for Young Children with Disabilities Special Education Research Program** http://ies.ed.gov/ncser. For these programs, the term "students with disabilities" is defined as in the Individuals with Disabilities Education Act as a child "(i) with mental retardation, hearing impairments (including deafness), speech or language impairments, visual impairments (including blindness), serious emotional disturbance (referred to in this title as 'emotional disturbance'), orthopedic impairments, autism, traumatic brain injury, other health

impairments, or specific learning disabilities; and (ii) who, by reason thereof, needs special education and related services." (Part A, Sec. 602)

For the FY 2007 Math/Science program, applicants must submit under *either* Goal One *or* Goal Two *or* Goal Three *or* Goal Four *or* Goal Five. More details on the requirements for each goal are listed in the section on General Requirements of the Proposed Research. In this section, specific requirements that apply to applications to the Math/Science topic are described.

(i)   Goal One incorporates efforts to identify curricula and instructional approaches that are associated with better student outcomes in mathematics and science. The understanding developed through Goal One awards is expected to be relevant to the design and implementation of future interventions. The typical methodology for Goal One will be the analysis of existing databases, including state longitudinal databases, using statistical approaches that allow for testing models of the relationships among variables in ways that strengthen hypotheses about paths of influence. More details on the requirements for applications submitted under Goal One are described in the Goal One sub-section of the General Requirements of the Proposed Research section. For the FY 2007 Math/Science topic, Goal One is limited to pre-kindergarten through high school.

(ii)   Applicants proposing to develop new curricula or instructional approaches should apply under Goal Two. Also allowable under Goal Two are applications to obtain preliminary (pilot) student outcome data on the correlation between exposure to an intervention and mathematics or science performance for fully developed curricula or instructional approaches that have not previously been evaluated with student outcome data. Under Goal Three, the Institute will accept proposals to conduct efficacy or replication trials of interventions. Goal Four targets evaluations of the effectiveness of curricula or instructional approaches implemented at scale. The second through fourth goals can be seen as a progression from development (Goal Two) to efficacy (Goal Three), to effectiveness at scale (Goal Four). Additional requirements for applications submitted under Goal Two, Three, or Four are described in the Goal Two, Goal Three, and Goal Four sub-sections of the General Requirements of the Proposed Research section.

Applicants proposing to develop or evaluate *mathematics* curricula or instructional approaches (i.e., Goals 2-4) must target students at any level from pre-kindergarten through high school or must propose curricula or instructional approaches for teaching basic mathematics skills to adults through adult and vocational education programs or through developmental/bridge programs designed to help under-prepared students acquire the skills to succeed in college.

Applicants proposing to develop or evaluate *science* curricula or instructional approaches (i.e., Goals 2-4) must target students at any level from pre-kindergarten through high school.

(iii)   Under the Math/Science topic, Goal Five addresses the need to develop and validate mathematics and science education measurement tools to be used for instructional purposes (e.g., progress monitoring). To improve mathematics and science achievement, instruction may need to be tailored to the sources of difficulty that individual students experience. An ideal learning environment might involve regular and frequent assessment of skills and the possibility of individualized instruction for students based on the particular source of their difficulties.

Through Goal Five, the Institute intends to support the development of diagnostic assessments in mathematics and science and assessments to monitor progress for instructional purposes in mathematics and science.

Under Goal Five, the Institute will accept applications to develop and/or validate *mathematics* assessments that target students at any level from pre-kindergarten through high school or adults who are learning basic mathematics skills through adult and vocational education programs or through developmental/bridge programs designed to help under-prepared students acquire the skills to succeed in college. The Institute will also accept applications to develop and/or validate science assessments for students at any level from pre-kindergarten through high school.

(1)   *Requirements of proposed assessments*. Applicants under Goal Five should propose to develop assessments that can be used in authentic education settings to identify sources of difficulty in mathematics or science in students from pre-kindergarten through high school or adults who are learning basic mathematics skills, or to monitor progress in mathematics or science for instructional purposes. Applications that would be appropriate for consideration under Goal Five include, but are not limited to: (a) proposals to develop new assessments that teachers could use to inform classroom instruction; (b) proposals to modify or adapt existing assessments so that teachers can use them to inform daily or weekly instructional plans for specific students; and (c) proposals to adapt assessments originally designed and used for research purposes for broader use in instructional settings.

Applicants should provide a compelling rationale to support the development of the proposed assessment. Reviewers will consider the strength of the theoretical foundation for the proposed assessment, the existing empirical evidence supporting the proposed assessment, and whether the proposed assessment duplicates existing mathematics or science assessments. Applicants should clearly describe the components of the assessment (e.g., specific knowledge and skills that the instrument is designed to tap). When applicants clearly describe the components of the assessment, reviewers are better able to evaluate the relation between the theoretical and empirical foundation for the assessment and the assessment itself (e.g., does the proposed assessment capture critical skills?), and to judge whether the proposed assessment will meet the needs for which it is intended.

In developing these assessments, researchers should keep in mind the pragmatic constraints (e.g., number of students, limited class time, time required to train teachers to use the assessments, costs) that teachers and administrators will consider to determine whether the instrument is a viable option for use in classrooms and other education delivery settings. Applications should provide sufficient description of the proposed assessment and how it could be utilized within education delivery settings for reviewers to judge the practicality of the proposed assessment for instructional purposes.

By describing the theoretical and empirical support for the proposed assessment, the practical utility of the assessment, and the components of the assessment, applicants are addressing aspects of the significance of their proposal.

(2)   *Methodological requirements.* There are two aspects of the research methodology that applicants must clearly address: (a) the proposed methods for developing the assessment and (b) the proposed research methods for obtaining evidence of the *validity and reliability* of the instrument.

Applicants should describe the process they will use to collect empirical (but not necessarily experimental) data that will provide feedback for refining specific components of the assessment. As an example, suppose an applicant who proposes to develop a progress monitoring assessment for middle school teachers to use. As part of the development process, the applicant might propose to obtain feedback from students and teachers on initial and revised versions of the assessment. For example, after middle school students have completed an assessment, the researchers might probe students to see if, for example, they are interpreting questions in the way that the researchers intend for the questions to be understood. In addition, the researchers could propose to interview or conduct focus groups with teachers who pilot the initial and revised versions of the instrument to obtain feedback on feasibility of implementation, difficulties encountered, and possible suggestions for improving the materials. *Applicants should describe the iterative development process to be used in the design and refinement of the proposed measurement tool.*

Applicants should detail the proposed procedures for determining which skills are being "tapped" by the instrument (i.e., construct validity); selecting items to be used in the assessment; assessing difficulty of selected items; and obtaining representative responses to items. Applicants should clearly describe the research plans for determining the validity and reliability of the instrument. Applicants should describe the characteristics and size of samples to be used in each study, procedures for collecting data, measures to be used, and data analytic strategies.

(3)   *Personnel and resources.* Competitive applicants will have research teams that collectively demonstrate expertise in (a) mathematics or science, (b) learning of mathematics or science, (c) assessment, (d) implementation of, and analysis of results from, the research design that will be employed, and (e) working with teachers, schools, or other education delivery settings in which the proposed assessment might be used. Competitive applicants will have access to institutional resources that adequately support research activities and access to schools in which to conduct the research.

(4)   *Awards.* Typical awards under Goal Five will be $150,000 to $400,000 (total cost = direct + indirect costs) per year for a maximum of 4 years. Larger budgets will be considered if a compelling case can be made for such support. The size of award depends on the scope of the project.

C. Teacher Quality -- Reading and Writing
D. Teacher Quality – Mathematics and Science Education
The Institute's Teacher Quality Research program supports two topics: (a) Teacher Quality – Reading and Writing and (b) Teacher Quality – Mathematics and Science. The general purpose of the Teacher

Quality research program is to identify effective strategies for preparing future teachers or improving the performance of current classroom teachers in ways that increase student learning and school achievement. The Institute intends for the Teacher Quality research program to fulfill five goals: (1) identifying the characteristics of teachers that are associated with better student outcomes in reading, writing, mathematics or science in kindergarten through Grade 12, or school readiness at the pre-kindergarten level; and identifying programs and practices for teacher preparation or teacher professional development that are associated with better student outcomes in reading, writing, mathematics or science from kindergarten through Grade 12, or school readiness at the pre-kindergarten level, as well as mediators and moderators of the relations between student outcomes and these teacher characteristics, programs, or practices; (2) developing new programs and practices for teacher preparation or professional development that will eventually result in improving teacher practices and through them student learning and achievement; (3) establishing the efficacy of programs and practices for teacher preparation or professional development for improving teacher practices and through them student learning and achievement; (4) providing evidence of the effectiveness of teacher preparation or professional development programs that are implemented at scale and intended for improving teacher practices and through them student learning and achievement; and (5) developing and validating new assessments of teacher quality, or validating existing assessments for teachers at any grade level from pre-kindergarten through high school against measures of student achievement. Under these goals, the Institute supports development and evaluation of teacher preparation and teacher professional development interventions for (a) teaching reading, writing, mathematics or science from elementary school through high school; (b) improving school readiness skills (including development of pre-reading and pre-writing knowledge and skills, early mathematics and science concepts and skills) from pre-kindergarten through kindergarten; and (c) teaching basic skills in reading, writing, or mathematics to adults.

Long term outcomes of the Teacher Quality program will be an array of tools and strategies (e.g., pre-service and in-service programs, policies, assessments) that have been demonstrated to be effective for improving and assessing teacher performance in ways that are linked to increases in student achievement. In this Request for Applications, the term *teacher preparation* refers to pre-service training of teachers, and the term *professional development* refers to the in-service training of current teachers.

a.   *Background*. As described in the Background sections for the [Read/Write](#) and [Math/Science](#) topics, too many U.S. students are not becoming proficient in basic academic knowledge and skills in reading, writing, mathematics, and science. One approach to improving student learning is to identify effective curricula and instructional approaches; a second approach is to improve teachers' knowledge and skills. That is the approach taken by the Institute's Teacher Quality research program. Through this program, the Institute intends to improve the quality of teaching through development and evaluation of teacher preparation and professional development programs. *Those interested in improving teacher quality through systemic practices and policies (e.g., alternative certification, incentives for recruiting and retaining highly qualified teachers) should refer to the topic on [Education Policy, Finance, and Systems](#).*

Substantial numbers of students in middle and high school grades are taught mathematics or science by teachers without a college major or certification in the areas in which they are teaching. This is particularly the case in middle school. For example, the Condition of Education 2003 report (U.S. Dept. of Education, 2003) indicated that 23 percent of fifth through ninth graders, and 10 percent of high

school students receive mathematics instruction from teachers who had neither a major nor certification in mathematics; in science, these percentages are 17 and 7 percent, respectively. There is some research demonstrating that students taught by "out-of-field" teachers learn less in mathematics and science than do students of teachers who are trained in the field in which they are teaching (Goldhaber & Brewer, 1997; Goldhaber & Brewer, 2000; Monk, 1994).

The field of professional training in reading/writing and math/science requires more rigorous research evidence to help determine *what content* should be delivered to teachers, and *how to deliver* the content of the professional development, in order to have an impact on student academic achievement. The program also addresses *how to assess* the appropriate teacher knowledge and skills that are predictive of student achievement.

(i)   *What the content should be.* A major criticism of current teacher preparation programs is that many courses are not evidence-based and are often poorly linked to state standards. Another criticism is that content and pedagogy courses are inadequate. Content courses do not train students how to teach specific content, and pedagogy courses typically focus on generic, rather than content-specific instructional strategies. The Institute is interested in empirical tests of the efficacy of teacher preparation programs that are designed to develop broadly knowledgeable and competent pre-school and elementary school teachers who will be teaching all subjects to their students, as well as more specialized middle and secondary school teachers. The Institute is also interested in empirical examinations of teacher preparation programs that assess what teachers are taught, what they learn, and how this converges with state standards with regard to what the students these teachers will eventually teach should know and be able to do.

The Institute is also interested in examining professional development programs that are designed to develop different types of knowledge and skills. These include, but are not limited to, professional development programs designed to develop teachers' knowledge about a specific academic content area (e.g., mathematics, reading) and professional development programs designed around a specific curriculum, where the intent is to provide teachers with specific skills, strategies, and perhaps lesson plans for delivering this specific curriculum. Is it more beneficial for students if teachers are taught broad conceptual understanding of content or trained to deliver highly structured and well-researched content? Does the answer depend on factors such as the degree of teacher mobility within a school, the experience level of the teachers, or grade level (e.g., elementary versus secondary schools)?

(ii)   *How content should be delivered.* We have little reliable evidence about how to improve teacher preparation programs; how to appropriately balance content, pedagogy, and clinical training experiences; and who should deliver courses (e.g., discipline-based departments, like mathematics, or departments of teacher education). Similarly, although experts commonly believe that most current professional development offerings are not very effective, very little research exists that allows for clear causal interpretations of the impact of specific professional development programs or for knowing which elements of professional development programs (e.g., coaching) are critical or relatively more important than others.

In addition, despite the bodies of research in the cognitive sciences that identify basic principles of knowledge acquisition and memory, and elaborate distinct differences in the ways that experts and novices organize and use information, it is not evident that the development of teacher

professional development or teacher preparation programs has utilized this knowledge base. The Institute strongly encourages those who propose to develop new professional development or teacher preparation programs to build on this knowledge base (e.g., Anderson, Reder, & Simon, 2000; Carver & Klahr, 2001).

(iii)   *How should teacher knowledge be assessed?* The third issue addressed by the Teacher Quality research program is the development of practical assessments of teacher subject matter knowledge and pedagogical knowledge and skills, and validation of these assessments (or existing assessments) against measures of student learning and achievement. Understanding what skills and knowledge make a teacher effective, and identifying teacher candidates and current teachers who have these skills and knowledge is critical to developing a highly qualified teacher workforce.

Ideally, assessments of pedagogical knowledge and skills and subject matter knowledge would not only predict student achievement but also be practical to administer and cost-effective. Although some existing tests of pedagogical knowledge and subject matter knowledge have been correlated with the test takers' SAT or ACT scores (e.g., Gitomer, Latham, & Ziomek, 1999), validation of existing tests against measures of student learning and achievement remains to be accomplished. Hence, the Institute is interested in proposals to *validate existing measures* of pedagogical knowledge and subject matter knowledge against measures of student learning and achievement as well as proposals to *develop and validate new measures*. Assessments of teacher pedagogical and subject matter knowledge that predict student outcomes could form the basis for an improved system of certification and for determining the effectiveness of professional development activities.

(iv)   *What characteristics are associated with more successful teachers*?   Through Goal One (Identification), the Institute encourages studies that use existing databases to identify the characteristics of teachers that are associated with better student outcomes. For example, some characteristics of teachers, such as subject matter knowledge (Monk, 1994) and general verbal ability (Ehrenberg & Brewer, 1994; Greenwald, Hedges, & Laine, 1996), have been more consistently linked to student achievement. Through Goal One, the Institute also encourages proposals to use existing databases to identify programs for teachers (e.g., mentoring programs for novice teachers; master teachers/coaches to support classroom teachers) that are associated with better student outcomes.

b. *Specific requirements for applications submitted to the Teacher Quality – Read/Write topic*.
Applications submitted to the Teacher Quality – Read/Write topic must be relevant to programs for teachers of typically developing students or teachers of English language learners.

Applicants interested in teacher preparation or teacher professional development for teachers of students with disabilities should refer to the Institute's Research Grants Program on the Quality of Teacher and Other Service Providers for Students with Disabilities (http://ies.ed.gov/ncser). This applies to teachers of students with disabilities, where "students with disabilities" is defined as in the Individuals with Disabilities Education Act as a child "(i) with mental retardation, hearing impairments (including deafness), speech or language impairments, visual impairments (including blindness), serious emotional disturbance (referred to in this title as 'emotional disturbance'), orthopedic impairments, autism,

traumatic brain injury, other health impairments, or specific learning disabilities; and (ii) who, by reason thereof, needs special education and related services." (Part A, Sec. 602)

For the FY 2007 Teacher Quality – Read/Write topic, applicants must submit under *either* Goal One *or* Goal Two *or* Goal Three *or* Goal Four *or* Goal Five. More details on the requirements for each goal are listed in the section on General Requirements of the Proposed Research. In this section, specific requirements that apply to applications to the Teacher Quality – Read/Write topic are described.

Distinction between the Teacher Quality – Read/Write topic and the Reading and Writing topic. Applicants sometimes wonder whether the project they plan to propose is more appropriate for the Teacher Quality – Read/Write topic or for the Reading and Writing topic. Applications that are appropriate for the Reading and Writing topic are those that develop and/or evaluate specific reading or writing curricula or instructional approaches for students; whereas applications that are appropriate for the Teacher Quality program are those that have teachers as the primary target of the intervention. The Institute recognizes that this distinction may be blurred. Oftentimes implementation of a specific reading or writing curriculum includes training for teachers on how to best deliver the curriculum, but the focus of the intervention is the new curriculum for students. Similarly, implementation of a new instructional approach almost always includes training for teachers on the instructional approach, but the focus of the intervention is on a different approach for teaching students, not on different ways to train teachers. If the investigator is focusing on the outcomes of variations in curriculum content or variations in instructional approaches, then the application should be submitted to the Research on Reading and Writing topic. If the researcher is examining outcomes of variations in approaches to teacher training (pre-service or inservice training), then the application should be submitted to the Teacher Quality – Read/Write topic. Below are some examples to help clarify the intent of the two programs. In all cases, the Institute strongly encourages applicants to contact the program officers listed at the end of this announcement to help them identify the more appropriate topic under which to submit their application.

Projects for Teacher Quality – Read/Write Topic	Projects for the Reading and Writing Topic
Example A The district uses Reading Curriculum A for its elementary school students. Applicant proposes to test professional development training on reading instruction; half of the teachers receive the new training and half receive the district's regular training. All students receive Reading Curriculum A.	**Example B** The applicant proposes to evaluate a Reading curriculum for Grade 4 students. Half of the students will receive the new curriculum; half of the students will use the district's existing reading curriculum. The teachers whose students receive the new curriculum will receive training on how to implement the new curriculum. All teachers will participate in the district's professional development on reading.
Example C The applicant wants to test whether professional development to improve writing instruction can be delivered effectively using an online coaching model for teachers that is available to teachers on a daily basis versus a writing instruction coach who visits the classroom. Half of the teachers receive online coaching; half receive in-class coaching. The content of the professional development is the same for teachers in both groups. The basic curriculum that the students receive is the same in both groups.	**Example D** The applicant proposes to compare two different instructional approaches for teaching reading comprehension strategies to middle school students in the context of a social studies curriculum. All students receive the same social studies curriculum. Half of the students receive instruction using Instructional Approach A; the remaining students receive instruction using Instructional Approach B.

(i)   Goal One incorporates efforts to identify teacher characteristics or programs for teachers that are associated with higher student achievement in reading and writing. The understanding developed through Goal One awards is expected to be relevant to the selection of better teachers and the design and implementation of future interventions to improve teacher quality. The typical methodology for Goal One projects is the analysis of existing databases, including state longitudinal databases, using statistical approaches that allow for testing models of the relationships among variables in ways that strengthen hypotheses about paths of influence. For the FY 2007 Teacher Quality – Read/Write topic, Goal One is limited to projects that address (a) the association between teacher characteristics and student outcomes in reading or writing for students from elementary school through high school; (b) the association between teacher characteristics and student outcomes in pre-reading or pre-writing for students from pre-kindergarten through kindergarten; (c) the relation between teacher preparation or professional development for teaching reading or writing and student outcomes in from elementary school through high school; or (d) the relation between teacher preparation or professional development for teaching pre-reading or pre-writing from pre-kindergarten through kindergarten. More details on the requirements for applications submitted under Goal One are described in the Goal One sub-section of the General Requirements of the Proposed Research section.

(ii)   Goal Two is appropriate for applicants proposing to develop and conduct initial research on new teacher professional development or teacher preparation programs. In addition, the Institute recognizes that some existing teacher professional development programs do not have any data on the association between exposure to the professional development program and student outcomes. For programs falling into this category, the Institute will accept proposals to conduct initial research on the association between exposure to the program and student outcomes. Under Goal Three, the Institute will accept proposals to conduct efficacy or replication trials of teacher professional development or teacher preparation programs. Goal Four targets evaluations of the effectiveness of interventions implemented at scale. The second through fourth goals can be seen as a progression from development (Goal Two) to efficacy (Goal Three), to effectiveness at scale (Goal Four).

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Goals Two, Three, and Four are limited to (a) teaching reading or writing from elementary school through high school; (b) teaching pre-reading and pre-writing in pre-kindergarten or kindergarten; or (c) teaching reading or basic writing skills to adults through vocational or adult education programs and developmental/bridge programs designed to help under-prepared students acquire the skills to succeed in college. Additional requirements for applications submitted under Goal Two, Three, or Four are described in the Goal Two, Goal Three, and Goal Four sub-sections of the General Requirements of the Proposed Research section.

(iii)   Under the Teacher Quality Read/Write topic, Goal Five addresses the development and validation assessments of teacher subject matter and pedagogical knowledge and skills for students in teacher preparation programs, and new or current teachers at any level from pre-kindergarten through high school. Such tests might be used, for example, as a component of a state certification process for determining highly qualified teachers. Goal Five covers assessments relevant to core academic content areas (e.g., reading, writing, social studies, history), except mathematics and science. Because the requirements for applications under Goal Five differs across topics, the methodological requirements for Goal Five applications to the Teacher Quality – Read/Write topic are in this section.

(1)   *Requirements of proposed assessments*. Under Goal Five, applicants are invited to develop and/or validate assessments that measure teacher subject matter and pedagogical knowledge in core academic content areas (e.g., reading, writing, social studies, history), except mathematics and science. Assessments may be designed for teachers at any grade level (pre-kindergarten through high school). Applicants must propose to validate these measures against standardized measures of student learning and achievement (i.e., do teachers' scores on measures of content and pedagogical knowledge predict the achievement of their students?). Alternatively, applicants may propose to validate *existing* measures of teacher content and pedagogical knowledge against standardized measures of student achievement.

Applicants must provide a compelling rationale to support the development of the proposed assessment. Reviewers will consider the strength of the theoretical foundation for the proposed assessment, the existing empirical evidence supporting the proposed assessment, and whether the proposed assessment duplicates existing assessments of teacher subject matter knowledge and pedagogical knowledge. Applicants should clearly

describe the components of the assessment (e.g., specific knowledge and skills that the instrument is designed to tap) in sufficient detail to allow reviewers to evaluate relations between the theoretical and empirical foundations for the assessment and the assessment itself (e.g., does the proposed assessment capture critical skills?), and whether the proposed assessment will meet the needs for which it is intended. Applicants should consider the pragmatic constraints, such as ease of administration and cost, that states or districts will use to determine whether the instrument is a reasonable option for general use. In short, applicants must clearly and concisely articulate why the proposed assessment, as opposed to some other assessment, should be developed and/or validated.

By describing the theoretical and empirical support for the proposed assessment, the practical utility of the assessment, and the components of the assessment, applicants are addressing aspects of the significance of their proposal.

(2)   *Methodological requirements*. Applicants should detail the proposed procedures for developing the assessment instrument (e.g., procedures for determining which subject matter content and pedagogical knowledge are being "tapped" by the instrument (i.e., construct validity), procedures for selecting items to be used in the assessment, assessing difficulty of selected items, obtaining representative responses to questions). Applicants must clearly describe the research plans for assessing the validity and reliability of the instrument. Applicants should describe the characteristics and size of samples to be used in each study, procedures for collecting data, measures to be used, and data analytic strategies. Particularly for proposals using existing datasets (e.g., state or local student achievement databases), applicants should explicitly address how exclusion from testing, or missing data, will be handled within the statistical analysis. As an example, investigators might conduct "value-added" analyses to compare student achievement across teachers scoring at different levels on the proposed teacher assessment. Value-added analyses use statistically adjusted gain scores for individual students to estimate, for example, the effect of a particular teacher on his or her students' learning relative to the effects of other teachers on their students' learning.

(3)   *Personnel and resources*. Competitive applicants will have research teams that collectively demonstrate expertise in (a) the relevant academic content area (e.g., reading, writing, history, social studies); (b) instructional practice or teacher training; (c) assessment; (d) implementation of, and analysis of results from, the research design that will be employed; and (f) working with teachers, schools, or other education delivery settings in which the proposed assessment might be used. Competitive applicants will have access to institutional resources that adequately support research activities and access to schools in which to conduct the research.

(4)   *Awards*. Typical awards under Goal Five will be $150,000 to $400,000 (total cost = direct + indirect costs) per year for a maximum of 4 years. Larger budgets will be considered if a compelling case can be made for such support. The size of award depends on the scope of the project.

c. *Specific requirements for applications submitted to the Teacher Quality – Math/Science topic.*
Applications submitted to the Teacher Quality – Math/Science topic must be relevant to programs for
teachers of typically developing students or teachers of English language learners.

Individuals who are interested in teacher preparation or teacher professional development for teachers of
students with disabilities should refer to the Institute's Research Grants Program on the Quality of
Teacher and Other Service Providers for Students with Disabilities (http://ies.ed.gov/ncser). This
applies to teachers and other service providers of students with disabilities, where "students with
disabilities" is defined as in the Individuals with Disabilities Education Act as a child "(i) with mental
retardation, hearing impairments (including deafness), speech or language impairments, visual
impairments (including blindness), serious emotional disturbance (referred to in this title as 'emotional
disturbance'), orthopedic impairments, autism, traumatic brain injury, other health impairments, or
specific learning disabilities; and (ii) who, by reason thereof, needs special education and related
services." (Part A, Sec. 602)

For the FY 2007 Teacher Quality – Math/Science topic, applicants must submit under *either* Goal One
or Goal Two *or* Goal Three *or* Goal Four *or* Goal Five. More details on the requirements for each goal
are listed in the section on General Requirements of the Proposed Research. In this section, specific
requirements that apply to applications to the Math/Science topic are described.

*Distinction between the Teacher Quality – Math/Science topic and the Mathematics and Science
Education topic*. Applicants sometimes wonder whether the project they plan to propose is more
appropriate for the Teacher Quality – Math/Science topic or for the Mathematics and Science Education
topic. Applications that are appropriate for the Mathematics and Science Education topic are those that
develop and/or evaluate specific mathematics or science curricula or instructional approaches for
students; whereas applications that are appropriate for the Teacher Quality program are those that have
teachers as the primary target of the intervention. The Institute recognizes that this distinction may be
blurred. Oftentimes implementation of a specific mathematics or science curriculum includes training
for teachers on how to best deliver the curriculum, but the focus of the intervention is the new
curriculum for students. Similarly, implementation of a new instructional approach almost always
includes training for teachers on the instructional approach, but the focus of the intervention is on a
different approach for teaching students, not on different ways to train teachers. If the investigator is
focusing on the outcomes of variations in curriculum content or variations in instructional approaches,
then the application should be submitted to the Mathematics and Science Education topic. If the
researcher is examining outcomes of variations in approaches to teacher training (pre-service or
inservice training), then the application should be submitted to the Teacher Quality – Math/Science
topic. Below are some examples to help clarify the intent of the two programs. In all cases, the Institute
strongly encourages applicants to contact the program officers listed at the end of this announcement to
help them identify the more appropriate topic under which to submit their application.

Projects for Teacher Quality – Math/Write Topic	Projects for the Mathematics and Science Education Topic
Example A The district uses Math Curriculum A for its elementary school students. Applicant proposes to test professional development training on math instruction; half of the teachers receive the new training and half receive the district's regular training. All students receive Math Curriculum A.	**Example B** The applicant proposes to evaluate a math curriculum for Grade 4 students. Half of the students will receive the new curriculum; half of the students will use the district's existing math curriculum. The teachers whose students receive the new curriculum will receive training on how to implement the new curriculum. All teachers will participate in the district's professional development on math.
Example C The applicant wants to test whether professional development to improve science instruction can be delivered effectively using an online coaching model for teachers that is available to teachers on a daily basis versus a science instruction coach who visits the classroom. Half of the teachers receive online coaching; half receive in-class coaching. The content of the professional development is the same for teachers in both groups. The basic curriculum that the students receive is the same in both groups.	**Example D** The applicant proposes to evaluate an instructional approach for teaching science to middle school students. All students use the same textbooks. Half of the students are taught the content using the new instructional approach; the remaining students are taught as their teachers normally teach their classes. Only the teachers of students in the treatment group are trained to use this new instructional approach for teaching science.

(i)   Goal One incorporates efforts to identify teacher characteristics or programs for teachers that are associated with higher student achievement in mathematics and science. The understanding developed through Goal One awards is expected to be relevant to the design and implementation of future interventions to improve teacher quality. The typical methodology for Goal One projects is the analysis of existing databases, including state longitudinal databases, using statistical approaches that allow for testing models of the relationships among variables in ways that strengthen hypotheses about paths of influence. For the FY 2007 Teacher Quality – Math/Science topic, Goal One is limited to projects that address (a) the association between teacher characteristics and student outcomes in mathematics or science for students from pre-kindergarten through high school or (b) the association between teacher preparation or professional development for teaching mathematics or science and relevant student outcomes from pre-kindergarten through high school. More details are described in the Goal One sub-section of the General Requirements of the Proposed Research section.

(ii)   Goal Two is appropriate for applicants proposing to develop and conduct initial research on new teacher professional development or teacher preparation programs. In addition, the Institute recognizes that some existing teacher professional development programs do not have any data on the association between exposure to the professional development program and student outcomes. For programs falling into this category, the Institute will accept proposals to conduct

initial research on the association between exposure to the program and student outcomes. Under Goal Three, the Institute will accept proposals to conduct efficacy or replication trials of teacher professional development or teacher preparation programs. Goal Four targets evaluations of the effectiveness of interventions implemented at scale. The second through fourth goals can be seen as a progression from development (Goal Two) to efficacy (Goal Three), to effectiveness at scale (Goal Four).

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Goals Two, Three, and Four are limited to (a) teaching mathematics or science at any grade from pre-kindergarten through high school or (b) teaching basic mathematics skills to adults through adult and vocational education programs or developmental/bridge programs designed to help under-prepared students acquire the skills to succeed in college. Please see details in the Goal Two, Goal Three, and Goal Four sub-sections of the General Requirements of the Proposed Research section.

(iii)   Under the Teacher Quality Math/Science topic, Goal Five addresses the development and validation of assessments of teacher subject matter and pedagogical knowledge for students in teacher preparation programs, and new or current teachers at any level from pre-kindergarten through high school. Such tests might be used, for example, as a component of a state certification process for determining highly qualified teachers. Goal Five covers assessments relevant to teaching mathematics and science. Because the requirements for applications under Goal Five differs across topics, the methodological requirements for Goal Five applications to the Teacher Quality – Math/Science topic are in this section.

(1)   *Requirements of proposed assessments*. Under Goal Five, applicants are invited to develop and/or validate assessments that measure teacher subject matter and pedagogical knowledge in mathematics or science. Assessments may be designed for teachers at any grade level (pre-kindergarten through high school). Applicants must propose to validate these measures against standardized measures of student learning and achievement (i.e., do teachers' scores on measures of content and pedagogical knowledge predict the achievement of their students?). Alternatively, applicants may propose to validate *existing* measures of teacher content and pedagogical knowledge against standardized measures of student achievement.

Applicants must provide a compelling rationale to support the development and/or validation of the proposed assessment. Reviewers will consider the strength of the theoretical foundation for the proposed assessment, the existing empirical evidence supporting the proposed assessment, and whether the proposed assessment duplicates existing assessments of teacher subject matter knowledge and pedagogical knowledge. Applicants should clearly describe the components of the assessment (e.g., specific knowledge and skills that the instrument is designed to tap) in sufficient detail to allow reviewers to evaluate relations between the theoretical and empirical foundations for the assessment and the assessment itself (e.g., does the proposed assessment capture critical skills?), and whether the proposed assessment will meet the needs for which it is intended. Applicants should consider the pragmatic constraints, such as ease of administration and cost, that states or districts will use to determine whether the instrument is a reasonable option for general use. In short, applicants must clearly and concisely articulate why the

proposed assessment, as opposed to some other assessment, should be developed and/or validated.

By describing the theoretical and empirical support for the proposed assessment, the practical utility of the assessment, and the components of the assessment, applicants are addressing aspects of the significance of their proposal.

(2)   *Methodological requirements.* Applicants should detail the proposed procedures for developing the assessment instrument (e.g., procedures for determining which subject matter content and pedagogical knowledge are being "tapped" by the instrument (i.e., construct validity), procedures for selecting items to be used in the assessment, assessing difficulty of selected items, obtaining representative responses to questions). Applicants must clearly describe the research plans for assessing the validity and reliability of the instrument. Applicants should describe the characteristics and size of samples to be used in each study, procedures for collecting data, measures to be used, and data analytic strategies. Particularly for proposals using existing datasets (e.g., state or local student achievement databases), applicants should explicitly address how exclusion from testing, or missing data, will be handled within the statistical analysis. As an example, investigators might conduct "value-added" analyses to compare student achievement across teachers scoring at different levels on the proposed teacher assessment. Value-added analyses use statistically adjusted gain scores for individual students to estimate, for example, the effect of a particular teacher on his or her students' learning relative to the effects of other teachers on their students' learning.

(3)   *Personnel and resources.* Competitive applicants will have research teams that collectively demonstrate expertise in (a) the relevant academic content area (e.g., mathematics, physics, chemistry); (b) instructional practice or teacher training; (c) assessment; (d) implementation of, and analysis of results from, the research design that will be employed; and (f) working with teachers, schools, or other education delivery settings in which the proposed assessment might be used. Competitive applicants will have access to institutional resources that adequately support research activities and access to schools in which to conduct the research.

(4)   *Awards.* Typical awards under Goal Five will be $150,000 to $400,000 (total cost = direct + indirect costs) per year for a maximum of 4 years. Larger budgets will be considered if a compelling case can be made for such support. The size of award depends on the scope of the project.

E. Education Leadership

The Institute's Education Leadership research program addresses five goals (1) identifying the characteristics and practices of education leaders (e.g., principals, district superintendents) that are associated with better student outcomes from kindergarten through Grade 12 and identifying programs and practices for the preparation or professional development of education leaders that are associated with better student outcomes (e.g., student achievement, high school graduation) from kindergarten through Grade 12, as well as mediators and moderators of the relations between student outcomes and these leadership characteristics, programs, or practices; (2) developing new programs and practices for

the preparation or professional development of education leaders that will eventually result in improving the teaching and learning environment at the local level and, ultimately, student learning and achievement; (3) establishing the efficacy of programs and practices for the preparation or professional development of education leaders for improving the teaching and learning environment and, ultimately, student learning and achievement; (4) providing evidence of the effectiveness of programs and practices for the preparation or professional development of education leaders that are implemented at scale and intended for improving the teaching and learning environment and through it, student learning and achievement; and (5) developing and validating new assessments of the quality of education leaders, or validating existing assessments of education leaders against measures of student achievement from elementary grades through high school.

Long term outcomes of the Education Leadership program will be an array of tools and strategies (e.g., pre-service and in-service programs, policies, assessments) that have been demonstrated to be effective for improving and assessing the performance of education leaders (e.g., principals, superintendents) in ways that are linked to increases in student achievement. In this Request for Applications, the term *preparation* refers to pre-service training of education leaders, and the term *professional development* refers to the in-service training of current leaders.

a. *Background*. Through the Education Leadership research program, the Institute supports research to improve the quality of leadership and administration at the local level (e.g., building, district, and region) in order to enhance the teaching and learning environment for students and thereby improve student outcomes. This program is intended to support research on innovative approaches to the recruitment, retention, and training, and of education leaders as well as the development and evaluation of professional development programs for education leaders. Innovative approaches to recruitment of education leaders include alternative pathways to school leadership that are designed to eliminate barriers that keep talented potential school leaders from joining the profession and to provide the preparation and support necessary for these leaders to effectively function in today's complex education environment.

Although existing research suggests that by establishing conditions that support and strengthen teaching and learning, education leaders may have an indirect effect on student achievement, little rigorous research has addressed this topic. A recent meta-analysis suggests that there may be specific leadership practices that are associated with student achievement (Waters, Marzano, & McNulty, 2003). Much, however, is unknown about the causal impact of these leadership practices on the teaching and learning environment and, subsequently, on student learning. Some researchers have suggested that conventional principal preparation programs are misaligned with the skill-sets and knowledge actually needed by principals on a day-to-day basis (e.g., Hess & Kelly 2005; Levine 2005). However, there has been little systematic empirical research examining the full range of skills and knowledge (in areas such as finance, instruction, assessment, and accountability) needed by principals and their relation to the quality of the teaching and learning environment and, in turn, to student achievement. Nor is there much research examining how these needed skills and knowledge might vary according to school context (teacher-turnover, poverty-status, parental involvement, political and policy environments).

In addition, little systematic research has been conducted to determine the effects on student learning of making different choices in leadership-related strategies or investments at the state or district level (i.e. recruitment incentives, principal placements, leadership-evaluations). Limited research exists on

whether and how district-level leaders (e.g., superintendents, school boards) influence student learning; most empirical research on education leadership focused on principals. Moreover, much is unknown about how variations in leadership roles and functions across schools or districts are associated with student achievement and about the differential leadership needs of schools with differing management structures (e.g., schools operating under site-based management or reconstitution).

b. *Specific requirements for applications submitted to the Education Leadership topic.*
For the FY 2007 Education Leadership topic, applicants must submit under *either* Goal One *or* Goal Two *or* Goal Three *or* Goal Four. The Institute will not be accepting Goal Five Education Leadership applications for FY 2007. More details on the requirements for each goal are listed in the section on General Requirements of the Proposed Research. In this section, specific requirements that apply to applications to the Education Leadership topic are described.

(i)   Goal One incorporates efforts to identify (a) characteristics or practices of principals or other education leaders that are associated with better student outcomes or (b) programs for leaders that are associated with better student outcomes. The understanding developed through Goal One awards is expected to be relevant to the design and implementation of future interventions to improve leadership quality. The typical methodology for Goal One projects is the analysis of existing databases, including state longitudinal databases, using statistical approaches that allow for testing models of the relationships among variables in ways that strengthen hypotheses about paths of influence. For the FY 2007 Education Leadership topic, Goal One is limited to projects that address (a) the association between the characteristics and practices of education leaders and student outcomes for students from pre-kindergarten through high school or (b) the association between leadership preparation or professional development and relevant student outcomes from pre-kindergarten through high school. More details are described in the Goal One sub-section of the General Requirements of the Proposed Research section.

(ii)   Goal Two is appropriate for applicants proposing to develop and conduct initial research on new education leadership professional development or education leadership preparation programs. In addition, the Institute recognizes that some existing professional development or preparation programs do not have any data on the association between exposure to the professional development program and student outcomes. For programs falling into this category (see the Goal Two section for description of Goal Two, Type B projects), the Institute will accept proposals to conduct initial research on the association between exposure to the program and changes in the teaching and learning environment, as well as in student outcomes. Under Goal Three, the Institute will accept proposals to conduct efficacy or replication trials of professional development or preparation programs for education leaders. Goal Four targets evaluations of the effectiveness of interventions implemented at scale. The second through fourth goals can be seen as a progression from development (Goal Two) to efficacy (Goal Three), to effectiveness at scale (Goal Four).
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           Goals Two, Three, and Four are limited to professional development or preparation programs for education leadership from pre-kindergarten through high school. Please see details in the Goal Two, Goal Three, and Goal Four sub-sections of the General Requirements of the Proposed Research section.

F. Education Policy, Finance, and Systems

The Institute intends for the Education Policy, Finance, and Systems (Policy/Finance) research program to address five goals (1) identifying policies, systemic programs or practices, and education finance programs or practices that are associated with more effective teaching and learning environments as indicated by better student outcomes (e.g., student learning, high school graduation and dropout rates); (2) developing new policies, education finance, and systemic practices; (3) evaluating the efficacy of education policies, education finance programs and practices, and systemic programs and practices; (4) providing evidence on the effectiveness of policies, finance programs and practices, and other systemic practices, implemented at scale; and (5) developing and testing cost accounting tools and measurement systems that will enable education administrators to link student-level resources to student-level achievement data.

a. *Background*. Improving student achievement and educational attainment (e.g., high school graduation, enrollment in postsecondary education) is a national concern. Through the Policy/Finance program, the Institute supports research to improve student learning and achievement by identifying changes in the ways in which schools and districts are organized, managed, and operated that may be directly or indirectly linked to student outcomes. Rather than improving student learning by changing directly the curricula or instructional approaches, organizational and management approaches are generally designed to change the structure and operation of schools or districts in ways that may indirectly improve the overall teaching and learning environment and lead to increased student achievement. For example, differences in achievement among schools and districts serving students of similar economic and racial/ethnic backgrounds are likely to reflect, in part, differences in the alignment of components of policy and practice. When these differences occur within states where every school is operating under the same state standards and accountability system, they point to the potential importance of organizational and management variables at the local level in enhancing student learning.

As part of the Policy/Finance research program, the Institute encourages research to identify ways in which money and resources matter to student learning. For example, how can schools and districts use and allocate resources to improve the performance and capacity of teachers in ways that are tied to student achievement (e.g., merit pay tied to how much improvement students make relative to the prior year)? In districts that serve high proportions of students from low-income families or minority groups, for example, how can incentives be structured to recruit and retain highly qualified and experienced teachers in the schools that serve children with the greatest needs (e.g., bonuses for the best teachers and administrators to serve in high needs schools)?

Little rigorous research has established either a direct causal relation or associations between student achievement and various systemic or organizational strategies. For example, the Institute encourages research on the relations between (or the effects of) different forms of school governance (e.g., elected vs. appointed boards, state or mayoral takeovers) and student achievement and research on the relations between different forms of school organization and structure (e.g., year-round schooling vs. traditional academic year calendar, small learning communities) and student achievement. There is a dearth of rigorous research on how the implementation or effects of specific systemic strategies might vary according to school characteristics (e.g., experience-level or turnover rate of teaching staff). Similarly, little work has been conducted to determine the effects on student learning of making different choices in strategies or investments (e.g., smaller classes with less experienced, lower salaried teachers versus larger classes with higher paid, more experienced, and highly skilled teachers). The Institute also

welcomes proposals to examine the relation between specific strategies, such as alignment of curriculum, assessment, and performance standards, and student outcomes.

Finally, over the past decade, numerous problems have been noted with respect to using per-pupil expenditure data that are aggregated at the district- or school-level for answering questions related to how schools can make better use of their resources to improve student learning (National Research Council, 1999). For example, school districts commonly use district-wide averages of teacher salaries in estimating costs for individual schools; district-wide averages tend to hide the disparity across schools within a district. School-level per-pupil expenditure data collapse expenditures across students receiving different services, and when these data are associated with school-level student achievement scores, the data do not enable administrators to make informed decisions about the allocation of resources in ways that are meaningfully linked to student learning.

Under Goal 5, the Institute is interested in the development of practical cost accounting tools or measurement systems that will allow schools and districts to track *student-level resources* in ways that will enable administrators to make resource allocation decisions that are tied to student learning outcomes. As noted in the National Research Council report (1999), "traditional function and object categories that were developed to track revenues and expenditure data for fiscal auditing purposes do not represent a particularly useful lens on educational activity when the focus shifts to what schools strive to do instructionally and how they do it" (p. 318). Researchers are encouraged to develop and test new cost accounting tools or measurement systems that will invent, test, and analyze student or school resource measures to determine productivity. Researchers may build on or modify previous systems, such as those identified by Berne and Stiefel (1997), or develop and test entirely new approaches. Proposed systems should take into account the need for an overall cost accounting tool or measurement system that will enable schools and districts to determine student-level resources for educating students with special needs (including, for example, students from racial, ethnic, and linguistic minority groups that have traditionally underachieved academically and students with disabilities) and the excess costs of educating students with special needs in specific categories of expenditure.

b. *Specific requirements for applications submitted to the Policy/Finance topic*. For the FY 2007 Policy/Finance topic, applicants must submit under *either* Goal One *or* Goal Two *or* Goal Three *or* Goal Four *or* Goal Five. More details on the requirements for each goal are listed in the section on General Requirements of the Proposed Research. In this section, specific requirements that apply to applications to the Policy/Finance topic are described.

(i)   Goal One incorporates efforts to identify conditions related to education policy, finance, or management that are associated with and are potential determinants of academic outcomes. The understanding developed through Goal One awards is expected to be relevant to the design and implementation of future interventions. The typical methodology for Goal One will be the analysis of existing databases, including state longitudinal databases, using statistical approaches that allow for testing models of the relationships among variables in ways that strengthen hypotheses about paths of influence. For the FY 2007 Policy/Finance topic, Goal One is limited to education systems that include pre-kindergarten through high school.

(ii)   Applicants proposing to develop new programs, practices, or policies should apply under Goal Two. Under Goal Three, the Institute will accept proposals to conduct efficacy or replication trials of interventions. Goal Four targets evaluations of the effectiveness of interventions

implemented at scale. The second through fourth goals can be seen as a progression from development (Goal Two) to efficacy (Goal Three), to effectiveness at scale (Goal Four).

For FY 2007, Goals Two through Four include policy, finance, and management practices that are potentially effective for improving the teaching and learning environment and thereby increasing academic outcomes in education systems that include pre-kindergarten through high school.

(iii)   Goal Five is to develop and conduct research to validate cost accounting, budgeting, or other measurement tools that will enable education administrators to link student-level resources to student-level learning outcomes for education systems that include pre-kindergarten/kindergarten through high school.

(1)   *Requirements of proposed measurement tools.* The Institute is interested in cost accounting methods that are analogous to cost accounting systems used in business accounting, which are based on generally accepted accounting principles. The proposed development of the cost accounting tools must be supported by strong rationale or theory. The proposal must describe the principles, as well as the theory or rationale supporting the principles, to be used for the allocation of costs or expenditures to student levels. Developers of such tools should take into account the need for education administrators and policymakers to be able to determine the excess costs of educating students with special needs (e.g., English language learners, students with disabilities) in specific categories of expenditure.

The Institute recognizes that because the critical determinants of achievement may be, for example, *which* curriculum was purchased and *not* the amount that was spent on curriculum (or what type of professional development and not the amount that was spent on professional development, and so on), the Institute encourages the development of cost accounting systems that allow administrators to track such decisions along with the financial data. In addition, applicants should consider the pragmatic constraints (e.g., ease of use, flexibility, cost) that administrators will use to determine whether the system is a reasonable option for general use. Ultimately the goal is to develop a tool that will be practical, usable, and useful for school administrators.

Strong applications will include clear descriptions of the components of the proposed cost-accounting tool. When applicants clearly describe the components of the tool, reviewers are better able to judge whether the proposed tool will meet the needs for which it is intended.

By describing the principles to be used for the allocation of costs, as well as the theory supporting the principles, the pragmatic constraints, and the components of the proposed cost-accounting tool, applicants are addressing aspects of the significance of the proposal.

(2)   *Methodological requirements.* The proposal must provide a detailed research design and detailed specification of the financial and outcome data that will be used for developing

and testing the cost accounting, budgeting, or other measurement tool. The proposed analysis should include student cost estimates in relation to specific instructional programs or resource use patterns and a sensitivity study of how student cost estimates may change for alternative assumptions.

Applicants should detail how they will validate their system. For example, applicants might compare the results of their cost accounting, budgeting, or measurement tool with results obtained from using other cost-effectiveness measurement approaches on data from the same schools or districts. Alternatively, applicants might propose to apply their cost accounting tool to schools or districts that vary in student performance. Researchers might explore productivity and opportunity cost, as well as expenditures.

(3)   *Personnel and resources*. Competitive applicants will have research teams that collectively demonstrate expertise in (a) education finance; (b) technology related to development of the tool; (c) working with schools; and (d) implementation of, and analysis of results from, the research design that will be employed.

An applicant may involve *for-profit entities* in the project. Involvement of the commercial developer or distributor must not jeopardize the objectivity of the evaluation. *Collaborations including for-profit distributors of cost accounting, budgeting, or other measurement tools must justify the need for Federal assistance to undertake the evaluation of programs that are marketed to consumers and consider sharing the cost of the evaluation.*

(4)   *Awards*. Typical awards under Goal Five will be $150,000 to $400,000 (total cost) per year for a maximum of 4 years. Larger budgets will be considered if a compelling case can be made for such support. The size of the award depends on the scope of the project.

G. Postdoctoral Research Training

The Institute's objectives in creating the Postdoctoral Research Training Fellowship in the Education Sciences are to support the training of postdoctoral fellows interested in conducting applied education research and to produce a cadre of education researchers willing and able to conduct a new generation of methodologically rigorous and educationally relevant scientific research that will provide solutions to pressing problems and challenges facing American education.

a. *Background*. A number of recent reports have described current education practice as not resting on a solid research base (Coalition for Evidence-Based Policy, 2002; National Research Council 1999, 2000, 2002). Instead, policy and practice decisions are often guided by personal experience, folk wisdom, and ideology. Grounding education policy and practice in the United States on evidence will require a transformation of the field. Practitioners will have to turn routinely to education research when making important decisions, and education researchers will have to produce research that is relevant to those decisions. To achieve this ambitious agenda, there is a need for a cadre of well-trained scientists capable of conducting high quality research that is relevant to practitioners and policy makers.

There are significant capacity issues within the education research community. According to a survey conducted by the National Opinion Research Center, only 7 percent of doctorate recipients in the field of

Education cite research and development as their primary postdoctoral activity (Hoffer et al., 2003). Further, there seems to be a mismatch between what education decision-makers want from the education research community and what the education research community is providing. Education practitioners need research to help them make informed decisions in those areas in which they have choices to make, such as curriculum and teacher professional development. They want the research and development enterprise to generate valid and useable assessment instruments. They want information on the relative costs and benefits of different education investments.

Many of the questions raised by practitioners and policy makers require answers to questions of what works in education for whom and under what circumstances. These are causal questions that are best answered by research using randomized controlled trials or well-designed quasi-experimental designs. Yet, these are questions and methods with which relatively few in the education research community have been engaged. Although the total number of articles featuring randomized field trials in other areas of social science research has steadily grown over the past 30 years, the number of randomized trials in education has lagged far behind (Boruch, de Moya & Snyder, 2001; Cook, 2001), and the use of quantitative methods has become subordinate to the use of qualitative and narrative approaches. The dominance of qualitative methods in research reports in leading education research journals and the dominance of what works questions among practitioners is a clear sign of the mismatch between the focus of the practice community and the current research community.

Another category of questions raised by the practice community focuses on assessment. The standards and accountability movement has generated a ballooning demand for people who are trained in the design, implementation, analysis, and use of education tests and measures to assess the results of instruction, to aid in the selection and promotion of staff, and to support the management of schools and districts. Individuals with skills in psychometrics are needed throughout the education sector, from federal statistics agencies to state education agencies, from test developers to local school districts. However, no more than 15 Psychology doctoral degrees in psychometrics have been awarded in a given year since 1992, and a 10 year low of two were awarded in 2001 (APA Research Office, 2004). Supply is meager.

Yet another category of problems raised by practitioners and policy makers is the need for a new generation of teaching materials and curricula that take advantage of expanding knowledge of how people learn and that leverage new delivery mechanisms such as the internet and personal computers (National Research Council, 2000). The design, testing, and implementation of new teaching methods will require scientists who are well trained in cognition, learning, and motivation, and who also are prepared to grapple with the challenges of extending laboratory-derived knowledge of these topics to teaching and learning in complex, real-world environments. Researchers who can straddle the worlds of cognitive science and education practice are needed.

The needs of education policy and practice are served not only by research that directly addresses problem solution but also by research that raises questions and generates hypotheses that can eventually lead to new applications or refinements of existing approaches (National Research Council, 2002). Frequently hypothesis-generating research relies on complex statistical methods that can tease out potential causal influences in large, correlational datasets. Statistical training is also needed in the design and analysis of experimental and quasi-experimental studies, as well as survey and observational data. Although there are many doctoral training programs that focus on applied mathematics and

statistics, the application of this expertise to problems in education requires that students be grounded in education content. That, in turn, requires a concentration of students and faculty who are focused on education topics.

To increase the supply of scientists and researchers in education who are prepared to conduct rigorous evaluation studies, develop new products and approaches that are grounded in a science of learning, design valid tests and measures, and explore data with sophisticated statistical methods, this initiative will fund postdoctoral fellowships with academic mentors conducting research in the education sciences. Grants will be awarded to faculty members from disciplines and fields such as education, psychology, political science, economics, statistics, sociology, human development, and epidemiology within qualified institutions of higher education that will provide intensive training in education research and statistics. Postdoctoral students will typically be supported for two years, and will be expected to conduct research on education topics.

b. ***Specific requirements for applications submitted to the Postdoctoral Training topic***. Unlike the other topics listed in this request for applications, the Postdoctoral Training topic does not follow the Goal requirements of the research topics. Applicants submitting to the Postdoctoral Training topic should adhere to the requirements detailed in this section. Applicants who intend to revise and resubmit a proposal that was not funded in the Institute's FY 2006 competition must indicate on the application form that their FY 2007 proposal is a revised proposal. Their FY 2006 reviews will be sent to this year's reviewers along with their proposal. Applicants should indicate the revisions that were made to the proposal on the basis of the prior reviews using no more 3 pages of Appendix A.

Applications submitted to the Postdoctoral Training topic should include the components listed below.

(i)   *Training Director*. A Training Director will be the head of the training fellowship and is expected to be the primary mentor for the fellows' research and training activities. The Training Director will have overall responsibility for the administration of the award and interactions with the Institute.

         The Training Director must be the Principal or Co-Principal Investigator on one or more education research projects, currently supported by the Institute or other funding sources, that are appropriate for postdoctoral level research training. Proposals submitted to this topic must identify the ongoing grant-supported education research of the Training Director.

(ii)   *Plan for recruiting U.S. postdoctoral fellows*. Applicants must include a plan for recruiting U.S. postdoctoral fellows, including outreach efforts to encourage applications from members of underrepresented minorities and persons with disabilities. Training Directors are encouraged to consider recruiting fellowship candidates from disciplines other than their own.

         Up to two fellows will be supported at any given time and the length of a postdoctoral fellowship typically will be two years. Postdoctoral fellowship candidates must be citizens or permanent residents of the United States. Postdoctoral fellowship candidates must have received their doctorate prior to beginning the fellowship. The Institute must approve postdoctoral fellowship candidates who have received postdoctoral support through other federal training programs before candidates are offered a fellowship. The Institute must approve postdoctoral fellows who

have an existing relationship with the Training Director (e.g., dissertation advisor) before candidates are offered a fellowship

(iii)   *Plan for training postdoctoral fellows*. The applicant must include a plan for training postdoctoral fellows to conduct rigorous education research. Fellows should gain the breadth of skills and understanding necessary to conduct rigorous applied research in education and develop the capacity to independently carry out such research, including applying for grant funding and submitting results for publication in peer-reviewed journals.

Applicants should clearly specify the role that the fellows will play in the Training Director's education research projects, and how these and other training activities will produce independent researchers capable of developing their own education research programs, seeking grant support, and presenting the results of their research in peer-reviewed forums such as professional conferences and journals. *From the Institute's view, a postdoctoral training program would be successful if it produced education researchers who were able to submit competitive applications to the Institute's research competitions*. Applicants should consider how potential fellows will gain experience and training in the design and implementation of rigorous education research methods and statistical analyses. As appropriate, fellows may audit courses and engage in other training activities that enhance their knowledge and professional skills (e.g., auditing courses in areas not covered in the their doctoral training, training in the administration and scoring of research measures).

Fellows' research and training activities must address practical questions in education. It is anticipated that fellows will submit findings from their postdoctoral research activities to peer reviewed forums such as professional conferences and journals. Fellows will attend and present at professional conferences. Fellows are encouraged to work with the Training Director to seek independent grant support for their own research from the Institute or other sources.

(iv)   *Stipend support, travel, and additional costs*. The stipend amount for each fellow is $50,000 per year (12 months) for up to 2 years. A third year of support is possible but will require submission of a request for supplemental funding at the appropriate time and approval by the Institute. Fellows must make satisfactory progress in their research activities in order to remain eligible for fellowship funds. The fellowship must include fringe benefits (e.g., health insurance and normal fees) at the level afforded to other employees of the applicant institution at a similar level and class as the postdoctoral fellows, with the Institute's contribution not to exceed $10,500 per year per fellow. There are no funds for tuition costs; fellows are expected to audit any courses that are part of their training.

Funds should be requested to support both Training Director and fellows' travel for one two-day meeting each year in Washington, DC. Funds may be requested up to $12,000 per year per fellow to defray the costs of recruiting fellows (e.g., advertisements, travel of applicants necessary for interviews), costs of research by fellows (local travel to research sites, materials, personal computer), and fellow registration and travel expenses to attend professional conferences.   Applicants should note that there are no funds for faculty research or salaries through this program. Funds for facility renovation and maintenance are not allowed.

(v)   *Awards*. The Institute anticipates making awards of approximately $160,000 per year for 4 years. In no case should a request exceed $200,000 per year. The amount of the award will depend on the number of fellows to be supported on stipends. The amounts above assume that four fellows will be supported, for 2 years each, but applicants are free to request support for fewer fellows.

4.   TOPICS WITH NOVEMBER 16, 2006, TRANSMITTAL DEADLINE

A. Reading and Writing
Information regarding this topic is available in Section 3.A. Reading and Writing under Topics with July 27, 2006, Transmittal Deadline.

B. Interventions for Struggling Adolescent and Adult Readers and Writers
Through its Research on Interventions for Struggling Adolescent and Adult Readers and Writers (Adolescent/Adult Readers/Writers) grants program, the Institute intends to contribute to improvement of reading and writing skills among struggling adolescent and adult readers and writers by (1) identifying curriculum and instructional practices that are associated with better reading or writing outcomes as well as mediators and moderators of the relations between these practices and reading or writing outcomes; (2) developing curricula and instructional practices for teaching reading or writing to struggling adolescent and adult readers and writers or for addressing the underlying causes of their reading or writing difficulties; (3) evaluating fully developed curricula and instructional practices for teaching reading or writing to struggling adolescent or adult readers and writers through efficacy or replication trials; (4) evaluating the effectiveness of reading or writing curricula and instructional practices for struggling adolescent and adult readers and writers implemented at scale; and (5) developing and validating assessments that can be used in instructional settings to identify sources of reading and writing difficulties. The long-term outcome of this program will be an array of tools and strategies (e.g., assessments, instructional approaches) that have been documented to be effective for improving the reading and writing skills of struggling adolescent and adult readers and writers.

a. *Background*. A significant number of adolescent and adult readers are not able to read well enough to make sense of short passages, much less the longer stretches of text that most readers are expect to understand everyday. According to the 2005 National Assessment of Educational Progress (NAEP), 27 percent of eighth graders cannot read at the basic level and on the 2002 NAEP 26 percent of twelfth graders cannot read at the basic level. That is, when reading grade appropriate text these adolescents cannot extract the general meaning or make obvious connections between the text and their own experiences or make simple inferences from the text. In other words, they cannot understand what they have read. Studies show that adolescents who are struggling readers are at high risk of dropping out of high school without a diploma, graduating unprepared for college, and having limited opportunities in the workforce. (Carnevale, 2001; NCES, 2003)

Although the research base on the basic components of literacy and strategies to help young children learn to read is strong (e.g., Snow, Burns, & Griffin, 1998), much less research has examined how to identify, prevent, and remediate reading difficulties in middle and high school students. Some middle and high school students struggle with basic reading skills, such as decoding and word recognition. For adolescent students who have learned basic reading skills in the early grades, many continue to struggle with vocabulary, fluency, and comprehension beyond elementary school.

At the same time, the 2003 National Assessment of Adult Literacy finds that 14% of adults have no more than the most simple and concrete literacy skills. These adults are able to sign their names and can locate information in short prose texts, but are unable to read and understand material presented in pamphlets or newspaper articles.   Another 29% of the adult population demonstrates basic prose literacy skills, but cannot perform moderately challenging literacy activities, such as summarizing a text. Given the increasing need for literacy in the workplace (Barton, 2000), it is unsurprising that more than half of adults with below basic literacy levels are unemployed. In addition, adults with a basic mastery of prose literacy skills also confront challenges in the workplace. Approximately 38% of those individuals are currently unemployed.

Given that substantial numbers of adolescents and adults struggle with the basic tasks of reading and writing, the Institute of Education Sciences requests applications targeting the development and evaluation of reading and writing interventions and assessments designed for struggling adolescent and adult readers. The Institute intends for the Interventions for Struggling Adolescent and Adult Readers and Writers program to complement the Institute's existing program of research that supports research on curriculum and instructional approaches in reading and writing for typically developing readers. The goal of the Research on Reading and Writing grants program is to support research examining the development of proficient readers and writers. At the same time, however, the Institute recognizes that research efforts focusing on struggling adolescent and adult readers/writers are limited, and seeks to encourage researchers to attend to this critically important but under-studied instructional area. Struggling adolescent and adult readers/writers typically have received reading and writing instruction during their schooling, but continue to perform below grade-level expectations. The Institute is particularly interested in research efforts targeting adolescents and adults who may able to read and/or write, but whose performance level impedes their success either in the classroom or workplace. Adolescent students may not qualify for special education services, but their performance levels indicate a need for additional reading and/or writing instruction.

In general, the Interventions for Struggling Adolescent and Adult Readers and Writers research program focuses on approaches, strategies, and interventions that are intended to supplement, complement, or intensify the benefit struggling readers and writers would derive from the reading/writing instruction they typically receive. By soliciting applications that focus exclusively on struggling adolescent and adult readers and writers, the Institute intends to support the identification, development, and validation of approaches that can improve the outcomes of struggling adolescent and adult readers and writers.

b.   *Specific requirements for applications submitted to the Adolescent/Adult Readers/Writers topic*.
The Institute is particularly interested in interventions for students who are from low-income backgrounds and/or racial, ethnic, and linguistic minority groups that have underachieved academically, but will consider applications that focus on other populations if the results are likely to be applicable across socio-economic and racial, ethnic, and linguistic categories.

By struggling adolescent readers and writers, the Institute means those middle or high school students who have not been identified with disabilities, but whose reading or writing skills are at least two years below grade level. By struggling adult readers and writers, the Institute refers to adults whose reading and writing skills prevent them from carrying out simple daily tasks. Examples of these tasks include reading and completing a simple form and summarizing a short newspaper article. Struggling adult

readers find that their inability to read and write well impedes their ability to pursue formal education and limits their employment opportunities.

Individuals who are interested in conducting research on interventions for students with disabilities should refer to the Institute's **Reading, Writing, and Language Development Special Education Research Grants Program** (http://ies.ed.gov/ncser). For this program, the term "students with disabilities" is defined as in the Individuals with Disabilities Education Act, as a child "(i) with mental retardation, hearing impairments (including deafness), speech or language impairments, visual impairments (including blindness), serious emotional disturbance (referred to in this title as 'emotional disturbance'), orthopedic impairments, autism, traumatic brain injury, other health impairments, or specific learning disabilities; and (ii) who, by reason thereof, needs special education and related services." (Part A, Sec. 602)

For the FY 2007 Adolescent/Adult Readers/Writers program, applicants must submit under *either* Goal One *or* Goal Two *or* Goal Three *or* Goal Four *or* Goal Five. More details on the requirements for each goal are listed in the section on General Requirements of the Proposed Research. In this section, specific requirements that apply to applications to the Adolescent/Adult Reader topic are described.

(i)   Goal One incorporates efforts to identify curricula and instructional approaches that are associated with better reading and/or writing outcomes. The understanding developed through Goal One awards is expected to be relevant to the design and implementation of future interventions. The typical methodology for Goal One will be the analysis of existing databases, including state longitudinal databases, using statistical approaches that allow for testing models of the relationships among variables in ways that strengthen hypotheses about paths of influence. More details on the requirements for applications submitted under Goal One are described in the Goal One sub-section of the General Requirements of the Proposed Research section. For the Adolescent/Adult Readers/Writers topic, Goal One is limited to struggling adolescents and adults in middle school, high school, vocational education, post-secondary education (limited to remedial or developmental reading and writing curricula), and adult education.

(ii)   Applicants proposing to develop new curricula or instructional approaches should apply under Goal Two. Also allowable under Goal Two are applications to obtain preliminary (pilot) student outcome data on the correlation between exposure to an intervention and reading or writing performance for fully developed curricula or instructional approaches that have not previously been evaluated with student outcome data. Under Goal Three, the Institute will accept proposals to conduct efficacy or replication trials of reading or writing curricula or instructional approaches. Goal Four targets evaluations of the effectiveness of curricula or instructional approaches implemented at scale. The second through fourth goals can be seen as a progression from development (Goal Two) to efficacy (Goal Three), to effectiveness at scale (Goal Four). Additional requirements for applications submitted under Goal Two, Three, or Four are described in the Goal Two, Goal Three, and Goal Four sub-sections of the General Requirements of the Proposed Research section.

        Applicants proposing to develop or evaluate *reading or writing* interventions (i.e., Goals 2-4) must target struggling adolescents and adults in middle school, high school, vocational

education, post-secondary (limited to remedial or developmental reading and writing curricula), and adult education.

(iii)   Under the Adolescent/Adult Readers/Writers topic, Goal Five addresses the need to develop and validate reading and writing measurement tools to be used for instructional purposes (e.g., progress monitoring). To improve reading and writing skills, instruction may need to be tailored to the sources of difficulty that individual students experience. An ideal learning environment might involve regular and frequent assessment of skills and the possibility of individualized instruction for students based on the particular source of their difficulties. Through Goal Five, the Institute intends to support the development of diagnostic assessments in reading and writing and assessments to monitor progress in reading and writing.

(1)   *Requirements of proposed assessments.* Applicants under Goal Five should propose to develop assessments that can be used in education delivery settings to identify sources of reading or writing difficulty or to monitor progress in reading or writing instruction for students from middle through high school, postsecondary, vocational education, and adult education. Applications that would be appropriate for consideration under Goal Five include, but are not limited to: (a) proposals to develop new assessments that teachers could use to inform classroom instruction; (b) proposals to modify or adapt existing assessments so that teachers can use them to inform daily or weekly instructional plans for specific students; and (c) proposals to adapt assessments originally designed and used for research purposes for broader use in instructional settings.

Applicants should provide a compelling rationale to support the development of the proposed assessment. Reviewers will consider the strength of the theoretical foundation for the proposed assessment, the existing empirical evidence supporting the proposed assessment, and whether the proposed assessment duplicates existing reading assessments. Applicants should clearly describe the components of the assessment (e.g., specific knowledge and skills that the instrument is designed to tap). When applicants clearly describe the components of the assessment, reviewers are better able to evaluate the relation between the theoretical and empirical foundation for the assessment and the assessment itself (e.g., does the proposed assessment capture critical skills?). By clearly describing the components of the assessment, reviewers are better able to judge whether the proposed assessment will meet the needs for which it is intended.

In developing these assessments, researchers should keep in mind the pragmatic constraints (e.g., number of students, limited class time, time required to train teachers to use the assessments, costs) that teachers and administrators will consider to determine whether the instrument is a viable option for use in classrooms and other education delivery settings. Applications should provide sufficient description of the proposed assessment and how it could be utilized within education delivery settings for reviewers to judge the practicality of the proposed assessment for instructional purposes.

By describing the theoretical and empirical support for the proposed assessment, the practical utility of the assessment, and the components of the assessment, applicants are addressing aspects of the significance of their proposal.

(2)   *Methodological requirements*. There are two aspects of the research methodology that applicants must clearly address: (a) the proposed methods for developing the assessment and (b) the proposed research methods for obtaining evidence of the *validity and reliability* of the instrument.

Applicants should describe the process they will use to collect empirical (but not necessarily experimental) data that will provide feedback for refining specific components of the assessment. As an example, suppose an applicant who proposes to develop a progress monitoring assessment for middle school teachers to use. As part of the development process, the applicant might propose to obtain feedback from students and teachers on initial and revised versions of the assessment. For example, after middle school students have completed an assessment, the researchers might probe students to see if, for example, they are interpreting questions in the way that the researchers intend for the questions to be understood. In addition, the researchers could propose to interview or conduct focus groups with teachers who pilot the initial and revised versions of the instrument to obtain feedback on feasibility of implementation, difficulties encountered, and possible suggestions for improving the materials. *Applicants should describe the iterative development process to be used in the design and refinement of the proposed measurement tool.*

Applicants should detail the proposed procedures for determining which reading difficulties are being "tapped" by the instrument (i.e., construct validity); selecting items to be used in the assessment; assessing difficulty of selected items; and obtaining representative responses to items. Applicants should clearly describe the research plans for determining the validity and reliability of the instrument. Applicants should describe the characteristics and size of samples to be used in each study, procedures for collecting data, measures to be used, and data analytic strategies.

(3)   *Personnel and resources*. Competitive applicants will have research teams that collectively demonstrate expertise in (a) reading and/or writing, (b) assessment, (c) implementation of, and analysis of results from, the research design that will be employed, and (d) working with teachers, schools, or other education delivery settings in which the proposed assessment might be used. Competitive applicants will have access to institutional resources that adequately support research activities and access to schools in which to conduct the research.

(4)   *Awards*. Typical awards under Goal Five will be $150,000 to $400,000 (total cost = direct + indirect costs) per year for a maximum of 4 years. Larger budgets will be considered if a compelling case can be made for such support. The size of award depends on the scope of the project.

C. Mathematics and Science Education

Information regarding this topic is available in under Topics with July 27, 2006, Transmittal Deadline.

D. Teacher Quality – Reading and Writing
E. Teacher Quality – Mathematics and Science Education
Information regarding this topic is available in <u>Section 3.C. Teacher Quality – Reading and Writing</u>;
<u>Teacher Quality – Mathematics and Science Education</u> under Topics with July 27, 2006, Transmittal
Deadline.

F. Cognition and Student Learning
The purpose of the Cognition and Student Learning (Cognition) research program is to improve student
learning by bringing recent advances in cognitive science to (1) develop interventions – instructional
approaches, practices, and curriculum – for improving student learning, (2) establish the efficacy of
existing interventions and approaches for improving student learning with efficacy or replication trials,
and (3) develop measurement tools that can be used to improve student learning and achievement. The
long-term outcome of this program will be an array of tools and strategies (e.g., instructional
approaches, computer tutors) that are based on principles of learning and information processing gained
from cognitive science and that have been documented to be efficacious for improving learning in
education delivery settings.

a. *Background*. The most important outcome of education is student learning. Recent advances in
understanding learning have come from cognitive science, cognitive psychology, and neuroscience
research, but these advances have not been widely or systematically tapped in education. The Institute
intends for the Cognition research program to establish a scientific foundation for education by building
on these theoretical and empirical advances and applying them to education practice with the goal of
improving student learning and academic achievement. The Institute is supporting research on this topic
in order to establish a stream of research bridging basic cognitive science and education.

Cognitive science has shown explosive growth in the last 30 years. Basic research in cognitive science
within disciplines such as psychology, linguistics, and neuroscience has generated new and important
fundamental knowledge on how people learn. Cognitive scientists have identified a number of basic
principles of learning that are supported by a solid research base (e.g., Carver & Klahr, 2001). For the
most part, however, these research principles have not been incorporated into education practice, either
at the level of instruction or through the creation of materials that support teaching and learning.

One explanation for the limited use of instructional practices based on cognitive science is that authentic
education settings are often quite different from the laboratory. Contrasted with learning in laboratory
settings, learning in everyday instructional settings typically involves content of greater complexity and
scope, delivered over much longer periods of time, with much greater variability in delivery, and with
far more distractions and competitors for student time and effort. Moreover, the parameters that have
defined "learning" in laboratory experiments are often not the same as what defines learning in school.
For example, in laboratory experiments learning is typically defined as having occurred if individuals
can recall an item a few minutes or hours after presentation and rarely are individuals asked to recall
items days, weeks, or months after presentation. In school, however, students are expected to remember
information presented in September the following May and to be able to use that information in
subsequent years. Students in school are expected to learn sets of related concepts and facts and to build
on that knowledge over time. Before some principles of learning generated from research in cognitive
science can be applied to instruction in classroom settings, we need to understand if the principles

generalize beyond well-controlled laboratory settings to the complex cognitive and social conditions of the classroom.

Another explanation for why principles of learning based on cognitive research have not been incorporated into instructional practice may be that cognitive scientists have not traditionally worked directly with those involved in teacher training and curriculum development. Consider, for instance, research on the structure and organization of knowledge. Cognitive scientists have examined differences between experts and novices in a variety of domains and have discovered basic principles underlying how learners organize knowledge as a function of familiarity and expertise within a given domain. Understanding how novices acquire and organize new information would seem to be critical, for example, to sequencing the content of curricula. Typically, however, curricula reflect how knowledge in a field is organized by experts and do not reflect how knowledge is acquired by novices.

Yet another explanation for why advances in understanding how people learn have not affected learning in applied settings is that little attention has been devoted to engineering solutions based on that understanding. Knowledge of how brain and mind work does not lead directly and immediately to methods and approaches that will enhance learning in the everyday world; knowledge of how people learn is not, in and of itself, a pedagogy, nor is there any one-to-one relationship between cognitive principles and particular methods of instruction.

Through the Cognition research program, the Institute will support research that utilizes cognitive science to develop, implement, and evaluate approaches that promise to improve teaching and learning in authentic education settings. Applicants should clearly identify the education problem they intend to address. As an example, typically by Grade 4, students are expected to learn new content by reading textbooks. One approach to improving students' learning through textbooks is to focus on ways to improve reading comprehension; another approach is to identify more effective ways to organize and present academic content and review questions in textbooks. Can cognitive scientists develop and test guidelines for the organization of textbooks for elementary school students? As another example, are there ways to construct homework assignments that are more effective for helping students learn new information? Are there strategies to help students become better monitors of their own learning (i.e., to become better at knowing when they have a good understanding of a topic and when they need to spend more time mastering a concept)? Typical Cognition projects begin by identifying a specific learning or instructional problem in schools, considering which findings from the empirical literature might be relevant to tackling the problem, and then proposing a research plan for translating those findings into an educational strategy to address the problem. Researchers should note that the Institute is interested in the development of strategies and materials that involve students learning educationally meaningful or relevant components or units of academic content, such as would be covered in a chapter or multiple chapters addressing a topic or learning goal in a textbook. The Institute strongly encourages cognitive scientists to collaborate with education researchers who understand teaching and learning in the context of authentic education settings.

b. *Specific requirements for applications submitted to the Cognition topic*. For the FY 2007 Cognition topic, applicants must submit under *either* Goal Two *or* Goal Three *or* Goal Five. The numbering of goals is consistent across the Institute's research programs. The Cognition program only supports Goals Two, Three, and Five. More details on the requirements for each goal are listed in the

section on General Requirements of the Proposed Research. In this section, specific requirements that apply to applications to the Cognition topic are described.

(i)   Goal Two is appropriate for applicants proposing to develop and conduct initial research on new education interventions or approaches.   Although the majority of the work proposed under Goal Two should be conducted in authentic education settings (e.g., elementary school classrooms), some work may be conducted in laboratory settings.

Goal Three is appropriate for applicants proposing to evaluate fully developed interventions. Although applicants proposing Goal Two projects may include some experimental work that is conducted in laboratory settings, the Institute does **not** support laboratory research under Goal Three projects. Interventions that are ready to be evaluated through efficacy trials must be fully developed and ready to be implemented in authentic education settings. The second and third goals can be seen as a progression from development of an intervention (e.g., instructional approach, curriculum) in Goal Two to evaluation of the efficacy of a fully developed intervention in Goal Three. Additional requirements for applications submitted under Goal Two or Goal Three are described in the Goal Two and Goal Three sub-sections of the General Requirements of the Proposed Research section.

(ii)   To improve student learning in specific academic content areas (e.g., reading, mathematics, science), instruction may need to be tailored to the sources of difficulty that individual students experience. An ideal learning environment might involve regular and frequent assessment of skills and the possibility of individualized instruction for students based on the particular source of their difficulties. Through Goal Five, the Institute intends to support the development of assessments to monitor progress in academic content areas.

In the Cognition program, Goal Five applies only to the development and validation of assessments for students from pre-kindergarten through adult education.

(1)   *Requirements of proposed assessments*. Applicants under Goal Five should propose to develop assessments that can be used in education delivery settings to monitor progress in academic content areas for instructional purposes. Applications that would be appropriate for consideration under Goal Five include, but are not limited to: (a) proposals to develop new assessments that teachers could use to inform classroom instruction; (b) proposals to modify or adapt existing assessments so that teachers can use them to inform daily or weekly instructional plans for specific students; (c) proposals to adapt assessments designed for K-12 education to use with adults; and (d) proposals to adapt assessments originally designed and used for research purposes for broader use in instructional settings.

Applicants should provide a compelling rationale to support the development and/or validation of the proposed assessment. Reviewers will consider the strength of the theoretical foundation for the proposed assessment, the existing empirical evidence supporting the proposed assessment, and whether the proposed assessment duplicates existing assessments. Strong applications will include clear and complete descriptions the components of the assessment (e.g., specific knowledge and skills that the instrument is designed to tap) in sufficient detail to allow reviewers to evaluate relations between the

theoretical and empirical foundations for the assessment and the assessment itself (e.g., does the proposed assessment capture critical skills?), and whether the proposed assessment will meet the needs for which it is intended. Applicants should clearly and concisely articulate why the Institute should invest in the development and/or validation of the proposed assessment, as opposed to some other assessment.

In developing these assessments, researchers should keep in mind the pragmatic constraints (e.g., number of students, limited class time, time required to train teachers to use the assessments, costs) that teachers and administrators will consider to determine whether the instrument is a viable option for use in classrooms and other education delivery settings. Applications should provide sufficient description of the proposed assessment and how it could be utilized within education delivery settings for reviewers to judge the practicality of the proposed assessment for instructional purposes.

By describing the theoretical and empirical support for the proposed assessment, the practical utility of the assessment, and the components of the assessment, applicants are addressing aspects of the significance of their proposal.

(2)   *Methodological requirements*. Applicants should detail the proposed procedures for developing the assessment instrument (e.g., procedures for determining which reading or mathematics difficulties are being "tapped" by the instrument (i.e., construct validity); selecting items to be used in the assessment; assessing difficulty of selected items; and obtaining representative responses to items). Applicants should clearly describe the research plans for determining the validity and reliability of the instrument. Applicants should describe the characteristics and size of samples to be used in each study, procedures for collecting data, measures to be used, and data analytic strategies.

(3)   *Personnel and resources*. Competitive applicants will have research teams that collectively demonstrate expertise in (a) the specific academic content area (e.g., reading); (b) assessment; (c) implementation of, and analysis of results from, the research design that will be employed; and (d) working with teachers, schools, or other education delivery settings in which the proposed assessment might be used. Competitive applicants will have access to institutional resources that adequately support research activities and access to schools in which to conduct the research.

(4)   *Awards*. Typical awards under Goal Five will be $150,000 to $400,000 (total cost = direct + indirect costs) per year for a maximum of 4 years. Larger budgets will be considered if a compelling case can be made for such support. The size of award depends on the scope of the project.

G. High School Reform

The purpose of the Institute's education research program on High School Reform is to support research on approaches, programs, and practices that enhance the potential of at-risk students to complete high school with the skills necessary for success in the workplace, college, or the military. The long-term goal of the program of Research on High School Reform is to provide an array of effective high school reform practices that have been shown to be effective for improving student outcomes. This research

program is designed to support crosscutting reform efforts. It will complement the Institute's existing research programs on teacher quality, reading and writing, interventions for struggling adolescent and adult readers, mathematics and science education, education leadership, and policy and systems, each of which includes high school education. Although these research programs include research on interventions at the high school level, the High School Reform education research program is different from these research programs in three ways. First, it focuses exclusively on improving educational outcomes in high schools. Second, it focuses on a particular population – students who are at-risk of dropping out of high school or who finish high school without the skills necessary to be ready for the demands of the workplace, the military, or college. Third, it focuses on approaches, strategies, and interventions that are intended to supplement, complement, intensify, or in some sense, act as a catalyst to increase the benefit at-risk students would otherwise derive from their academic coursework. In other words, for the Research on High School Reform initiative, the Institute is interested in approaches, such as mentoring and structural reforms, that can augment the effects of better instruction and higher quality teachers in the core academic subjects by serving the needs of students who are poorly prepared academically and motivationally for the demands of high school.

a. *Background*. Improving high school students' academic achievement and graduation rates is of national concern. According to the most recent National Assessment of Educational Progress (NAEP), only 36 percent of twelfth grade students read at or above the proficient level, and only 26 percent write at or above that level. Similarly for mathematics, only 16 percent of Grade 12 students scored at or above the proficient level, and only 18 percent for science. Low levels of academic achievement in high school affect postsecondary education. According to the National Center for Education Statistics, in 2000, 28 percent of college freshmen took at least one remedial course in reading, writing or mathematics. Further, the ACT reports that in the class of 2004, only 26 percent of high school students who took the ACT college entrance exam had scores predictive of earning a "C" or higher in college algebra. Across the board, low levels of achievement are more likely among minority groups and students from low-income backgrounds than among students from advantaged backgrounds.

Concerns over levels of academic achievement in Grade 12 are overshadowed by concern for the large number of students who do not make their way to a high school diploma. A variety of sources, including the National Center for Education Statistics, the Manhattan Institute, the Business Roundtable, and the Urban Institute, estimate the proportion of students who graduate from high school on time falls between 68 percent and 75 percent. The same sources estimate on-time graduation rates to be only slightly above 50 percent for students who are black, Hispanic, or Native American, and for students who attend schools in high poverty districts.

Although rigorous research on high school reform is meager, there are a few findings and developments that point the way toward approaches, strategies, and practices that could benefit from an intensive research and development effort through the Institute's High School Reform Research Initiative. These include but are not limited to (a) mentoring, (b) work-related experience, (c) positive incentives, (d) intensive remediation, (e) student accountability, (f) comprehensive school-based management, and (g) alternate schools and extended opportunities for high school completion.

Mentoring provides an individualized intervention with an adult who helps with many aspects of a student's life — academic, social, work, personal. Mentoring is a central component of a number of programs that are intended to enhance high school success for at-risk students. For example, Check and

Connect, a dropout prevention program for youth with disabilities, increased ninth grade course completion rate and student engagement for special education students (Sinclair, Christenson, Evelo, & Hurley, 1998). Empirical questions remain about the kind of training, levels of intensity, and cost-effective ratios of mentors to students needed to affect dropout/completion behavior and academic achievement.

Evidence on the effectiveness of programs that put careers and occupation-oriented knowledge at the center of high school life is mixed. There is a need for research on the conditions under which career and technical education can enhance the potential for at-risk students to complete high school with the skills needed to be successful in the workplace, college, or the military. A number of new directions have been proposed that have not been subjected to rigorous research or evaluation, such as dual enrollment/credit programs that permit students to obtain college-level credits or provide the opportunity to earn an industry-recognized credential while still in secondary school.

Incentives that encourage high school completion take many forms, ranging from "No pass, no play" laws that make participation in extracurricular activities contingent on passing all courses to cash rewards or gift certificates for school completion.   Although there is some evidence of the potential benefit of such interventions in other countries, research is needed on the effects of various types of incentives on high school completion and academic achievement in the United States and the conditions that may moderate the impact of such incentives.

Intensive academic remediation is likely to be critical to enhancing the probability that at-risk youth will complete high school with the skills needed for the workplace, college, or the military. The Institute encourages applications to develop and evaluate intensive academic remediation programs that cover reading, mathematics, and other basic academic skills, including programs that begin in middle school and are intended to better prepare and support the transition of at-risk students into high school. In addition, the Institute encourages research on the availability of rigorous coursework (e.g., Advanced Placement courses) or increased requirements in mathematics and science and the impact of such practices and policies on high school completion and dropout rates, school achievement, and college enrollment, particularly among students at-risk for failure in high school.

The issue of student accountability permeates discussions of high school reform. For low-performing schools, there is suggestive evidence that accountability policies may lead to achievement gains. For example, the accountability policy in Chicago has been associated with substantial increases in mathematics and reading achievement (Jacob, 2003). There is accumulating evidence suggesting that when high school exit exams are in place, schools and districts cover more of their state content standards, align their curricula and instruction with such standards, and are more likely to provide remedial instruction and other interventions designed to help students at-risk of failing (e.g., Wise et al., 2003). The Institute encourages applications proposing, for instance, interrupted time series analyses to examine the potential effect of high school exit examinations on high school completion and dropout rates, college enrollment, and academic achievement. In addition, the Institute is interested in applications to develop, implement, and assess the impact of different types of exit examinations (e.g., those designed to be especially sensitive at the lower end of the scale in order to test basic competencies vs. those that test a range of performance and include sensitivity at the upper end of the scale) or different examination systems (e.g., varying opportunities for re-examination, number of subjects

covered, remedial support for students who are at-risk for failing or fail their initial assessment opportunity).

Preliminary evidence suggests that broad based comprehensive school management reforms can produce positive results. These models, such as Talent Development and High Schools That Work, share several characteristics: a rigorous curriculum, high expectations for students, professional development for teachers, high levels of support for schools seeking to change, strong leadership at both the school and district level, and close ties among schools, the families of students, and their communities. Implementation, however, appears to be a significant challenge for comprehensive reforms. For example, studies of the High Schools That Work model demonstrate substantial variation in implementation, with greater gains for students in high-implementation sites than in moderate- and low-implementation schools. The consistency of results represents another challenge: A recent non-experimental evaluation of the Talent Development High School Model in Philadelphia found gains in attendance, academic course credits earned, and promotion rates for first time ninth grade students. However, there were only small gains in 11th grade standardized test scores in mathematics and no statistically significant gains in reading scores (Kemple, Herlihy, & Smith, 2005). The Institute is interested in research that addresses issues such as implementation in existing comprehensive reform models as well as research that will support local capacity to engage in comprehensive school-based management. For example, if truancy and low-reading skills among English language learners are major problems for high schools, then a management plan that compares promising reading and vocabulary approaches, coupled with low-tolerance truancy prevention might be tested.

Finally, alternative education programs for high school students are commonplace in today's school systems. Schools and programs have been developed with the understanding that some students need more than what a traditional high school experience can provide and may incorporate curriculum modifications, schools within a school, flexible schedules (including evening and weekend classes), small class sizes, individualized instruction, vocational counseling, social service linkages, tutoring, mentoring, and/or parent involvement programs. Students whose education prospects are hindered by individual (e.g., learning disabilities), family (e.g., uninvolved parents), and/or community (e.g., poverty, social disorganization) circumstances are specifically targeted for involvement, and such programs may include students at-risk for dropping out or who have already dropped out, students with poor academic performance, students who are truant or irregularly attend class, students with disciplinary problems (e.g., violent behavior, gang involvement, substance use), students who are pregnant or are parents, and students with mental health problems. Given the limited research base, evaluation of alternative education programs and schools as "interventions" for at-risk students would contribute to our understanding of the costs and benefits of such programs (and their components), with outcomes of interest including: academic achievement; disciplinary problems; school attendance, engagement, and connectedness; and high school completion or GED attainment.

In addition to potential benefits on academic outcomes, interventions such as mentoring and work-related experiences are thought to provide students with opportunities to develop the social skills and work habits necessary for success in the work place. Under Goal Five of the High School Reform topic, the Institute is interested in applications to develop and validate measures of students' non-cognitive behaviors (e.g., timeliness, responsibility, persistence, discipline, initiative, social competence) that could be used by teachers to evaluate students. Such evaluations could be incorporated into student

transcripts and provide students with a way to document growth and development in skills that are important to potential employers.

b. *Specific requirements for applications submitted to the High School Reform topic*. The Institute is particularly interested in interventions for high school students who are from low-income backgrounds and/or racial, ethnic, linguistic minority, and English learner groups that have underachieved academically, but will consider applications that focus on other populations if the results are likely to be applicable across socio-economic and racial, ethnic, and linguistic categories. The Institute encourages proposals that focus on interventions for high school students at-risk of dropping out, students with poor motivation, and students with low academic skills.

For the FY 2007 High School Reform topic, applicants must submit under *either* Goal One *or* Goal Two *or* Goal Three *or* Goal Four *or* Goal Five. More details on the requirements for each goal are listed in the section on General Requirements of the Proposed Research. In this section, specific requirements that apply to applications to the High School Reform topic are described.

(i)   Under Goal One applicants should seek to identify systemic, instructional, and/or professional development interventions and conditions that are associated with and are potential determinants of high school achievement and/or graduation rates. The understanding identified through Goal One awards is expected to be relevant to the design and implementation of future interventions. The typical methodology for Goal One will be the analysis of existing databases, including state or district longitudinal databases, using statistical approaches that allow for testing models of the relationships among variables in ways that strengthen hypotheses about paths of influence in high school reform. Existing datasets can be supplemented with additional data if it would be advantageous to the research program. For the High School Reform topic, Goal One is limited to examination of programs, practices, or policies that are implemented in high schools or in middle schools where the intent of the program is to support the transition into high school.

(ii)   Goals Two through Four can be seen as a progression from development (Goal Two) to efficacy (Goal Three) to effectiveness at scale (Goal Four). Applicants proposing to develop new interventions should apply under Goal Two. Under Goal Three, the Institute will accept proposals to conduct efficacy or replication trials of interventions. Goal Four targets evaluations of the effectiveness of interventions implemented at scale.

Applicants proposing to develop or evaluate programs, practices, or policies through the High School Reform program must target interventions implemented in high schools or in middle schools where the intent of the program, practice, or policy is to support the transition into high school. Additional requirements for applications submitted under Goal Two or Goal Three or Goal Four are described in sub-sections of the General Requirements of the Proposed Research section.

(iii)   Under the High School Reform topic, Goal Five addresses measures of the social skills and work habits necessary for success in the work place.

(1)   *Purpose of High School Reform Goal Five proposals.* Through Goal Five, the Institute intends to support the development and validation of measures of students' non-cognitive

behaviors (e.g., timeliness, responsibility, persistence, discipline, initiative, social competence) that could be used by teachers to evaluate students. Such evaluations could be incorporated into student transcripts and provide students with a way to document growth and development in skills that are important to potential employers. Under Goal Five (Measurement), the Institute invites applications to examine the validity and utilization of such instruments. What do they predict? What impact do they have on students and on high schools?   (Applications to develop and/or validate such instruments are appropriate for Goal Five under this topic. Individuals interested in examining the impact of such assessments on students or institutions, or the relation between implementation of the assessments and student/institutional outcomes should consider Goals One, Two, or Three.)

(2)   *Requirements of proposed assessments.* Applicants should provide a compelling rationale to support the development and/or validation of the proposed assessment. Reviewers will consider the strength of theoretical foundation for the proposed assessment, the existing empirical evidence supporting the proposed assessment, and whether the proposed assessment duplicates existing assessments. Applicants should clearly describe the components of the assessment (e.g., specific knowledge and skills that the instrument is designed to tap). When applicants clearly describe the components of the assessment, reviewers are better able to evaluate the relation between the theoretical and empirical foundation for the assessment and the assessment itself (e.g., does the proposed assessment capture critical skills?). By clearly describing the components of the assessment, reviewers are better able to judge whether the proposed assessment will meet the needs for which it is intended. Applicants proposing to examine the validity and utility of existing assessments should document the current use of the assessment.

 In developing these assessments, researchers should keep in mind the pragmatic constraints (e.g., number of students, limited class time, time required to train teachers to use the assessments, costs) that teachers and administrators will consider to determine whether the instrument is a viable option for use in classrooms and other education delivery settings. Applications should provide sufficient description of the proposed assessment and how it could be utilized within education delivery settings for reviewers to judge the practicality of the proposed assessment for instructional purposes.

By describing the theoretical and empirical support for the proposed assessment, the practical utility of the assessment, and the components of the assessment, applicants are addressing aspects of the significance of their proposal.

(3)   *Methodological requirements.* Applicants should detail the proposed procedures for developing the assessment instrument; selecting items to be used in the assessment; assessing difficulty of selected items; and obtaining representative responses to items. Applicants should clearly describe the research plans for determining the validity and reliability of the instrument. To the extent possible, applicants should also examine the predictive validity of assessments.   Applicants should describe the characteristics and size of samples to be used in each study, procedures for collecting data, measures to be used, and data analytic strategies.

(4)   *Personnel and resources.* Competitive applicants will have research teams that collectively demonstrate expertise in (a) the research program including the content areas, research design, and assessment, (b) implementation of, and analysis of results from, the research design that will be employed, and (c) working with teachers, schools, districts or other education delivery settings in which the proposed assessment might be used. Competitive applicants will have access to institutional resources that adequately support research activities and access to schools in which to conduct the research.

(5)   *Awards.* Typical awards under Goal Five will be $150,000 to $400,000 (total cost = direct + indirect costs) per year for a maximum of 4 years. Larger budgets will be considered if a compelling case can be made for such support. The size of award depends on the scope of the project.

H. Postsecondary Education

The Institute intends for the Postsecondary Education research program to address five goals: (1) identifying policies, programs or practices that are associated with improving access to, persistence in, or completion of postsecondary education; (2) developing new programs, practices, or policies that are intended to improve access to, persistence in, or completion of, in postsecondary education; (3) evaluating the efficacy of programs, practices, or policies that are intended to improve access to, persistence in, or completion of postsecondary education; (4) providing evidence on the effectiveness of programs, practices, or policies for improving access to, persistence in, or completion of, postsecondary education that are implemented at scale; and (5) developing and validating assessments of cognitive (e.g., problem-solving, creativity, writing) social cognitive (e.g., communication and interpersonal skills) and non-cognitive (e.g., responsibility, initiative) skills that are indicators of readiness for the work environment and outcomes of postsecondary education.

a. *Background*. Improving participation and persistence in postsecondary education is a national concern, especially for high-risk students. According to the National Center for Education Statistics (2005), there are substantial gaps across income groups in the percentages of high school graduates who enrolled in college the fall semester after high school graduation: 53 percent of students from low-income families, 58 percent from middle income families, and 80 percent from high income families. Similarly, there are differences across racial and ethnic groups in the percentages of high school graduates who enroll in college right after high school graduation: 66 percent of White students, 58 percent of Black students, and 59 percent of Hispanic students. Moreover, there continue to be gaps across income groups in the proportions of students who graduate from college or persist in college five years after their initial enrollment: 61 percent from low income families, 65 percent from middle income families, and 71 percent from high income families (Horn & Berger, 2004). Across racial and ethnic groups, the five-year graduation or persistence rate also varies: 59 percent for American Indian students, 77 percent for Asian/Pacific Islander students, 55 percent for Black students, 60 percent for Hispanic students, and 66 percent for White students.

Through the Postsecondary Research program, the Institute supports research to improve postsecondary access and completion by identifying programs, practices, and policies that are effective for improving access to or persistence in postsecondary education. In recent years, a number of innovative programs for improving access to postsecondary education have been implemented. For example, the California State University system has partnered with California's Department of Education and State Board of

Education to develop the Early Assessment Program for high school students. Through the Early Assessment Program, students in Grade 11 are assessed in English and mathematics to determine their readiness for college-level coursework. Students can use the results of the test to identify skills that they need to work on during their senior year in order to be better prepared for college. Little rigorous research exists to evaluate the impact such programs have on college enrollment and persistence.

The Institute encourages research on interventions to provide students and parents with information that may be related to students' choices regarding whether to go to college and where to go to college. According to the National Center for Education Statistics (Horn, Chen, & Chapman, 2003), both high school students and their parents are likely to markedly overestimate the cost of tuition and fees for one year of college. Further, among households in the lowest income groups, parents are more likely to report that they are not able to estimate the cost of tuition and among those who do estimate the cost, they are less likely to be within 25 percent of the actual average tuition cost for the type of institution in their state that their student wanted to attend. A number of different types of programs (e.g., parent education, counselors, websites) address students' and parents' access to information about college and planning ahead for college. The Institute encourages research to evaluate the impact of such programs on student enrollment.

A number of states have implemented merit-based scholarship programs intended to provide students with an incentive to perform well in high school and attend college. For example, in 1993, Georgia introduced the Georgia Hope Scholarship program, which covers tuition, allowable mandatory fees, and a book allowance in public colleges to Georgia high school graduates with a B average or better or a voucher of equal value for students who choose to attend private college. Continued receipt of the scholarship is contingent upon satisfactory academic progress. The introduction of the program was associated with increases in four-year public and private college attendance among young adults residing in Georgia (Cornwell, Mustard, & Sridhar, 2005). The Institute is interested in supporting rigorous evaluations of such programs.

Institutions of higher education have implemented a variety of programs and practices to improve student retention (e.g., learning communities, on-line advising and career-planning services, freshman seminars, bridge programs, remedial or developmental programs for under-prepared students). Some programs focus on building the skills of under-prepared students (e.g., developmental mathematics courses); others are intended to foster social support for students and create an intellectual and social environment that will encourage students to remain and succeed at the institution (e.g., learning communities; programs that target specific student populations such as under-represented minority students or women in engineering majors). The Institute invites applications to examine the impact of such programs on student retention and graduation.

Many colleges and universities have implemented assessments of students' college-level reading, writing, mathematics, and critical thinking skills in order to provide feedback for the improvement of their general education curriculum or for accreditation and accountability purposes. For example, the *Measure of Academic Proficiency and Progress* by ETS and the *Collegiate Assessment of Academic Proficiency* by ACT are two commercially available assessments for institutions of higher education. The Institute is interested in applications to examine the validity and utility of such assessments. What do these types of assessments predict? What are their effects on institutions and on students? (Applications to develop and/or validate such instruments are appropriate for Goal Five under this topic.

Individuals interested in examining the impact of such assessments on students or institutions, or the relation between implementation of the assessments and student/institutional outcomes should consider Goals One, Two, or Three.)

Finally, the high cost of attending college continues to be an important issue in postsecondary education. According to the College Board (2005a), in the 2005-2006 academic year, annual prices for undergraduate tuition, fees, room and board were estimated to be over $12,000 at four-year public colleges and $29,000 at four-year private colleges. For the same year, undergraduates at 2-year public institutions on average spent approximately $2,200 a year for tuition and fees (College Board 2005a). The Institute invites applications to examine the complex relations between student financial aid programs (including federal, state, and private sources) and access and completion of postsecondary education. Because financial aid comes from multiple sources, we encourage research on the interactions of aid programs (e.g., how institutions package available sources of financial aid to eligible students) and their subsequent effects on access and completion of postsecondary education.

Policymakers and higher education administrators seek answers to practical questions regarding the relative impact – both costs and benefits – of alternative approaches to student financial aid on access to and completion of postsecondary education for a wide range of student groups (e.g. traditional, non-traditional, economically disadvantaged). Applicants might consider, for example, the impact of loan financing or loan forgiveness on college completion of at-risk students or whether extending grant aid eligibility to high school students would spur development of dual enrollment programs and increase college enrollment of at-risk students. As another example, investigators might compare the impact of student financial aid policies (e.g., alternative methods for calculating student financial aid eligibility, the use of merit vs. need based criteria for student financial aid) on access to and completion of postsecondary education. All 50 states offer tax-deferred plans for saving for college (529 plans) and some states have college saving plans that guarantee full-tuition payment in the future. Who is utilizing these programs; what is the impact of such programs on access to postsecondary education? The Institute also invites rigorous research on new and existing federal and state financial aid programs intending to encourage students from low-income families to prepare for, enroll in, and succeed in postsecondary education.

b. *Specific requirements for applications submitted to the Postsecondary topic*. The Institute is particularly interested in interventions for postsecondary students who are from low-income backgrounds and/or racial, ethnic, linguistic minority, and English learner groups that have underachieved academically, but will consider applications that focus on other populations if the results are likely to be applicable across socio-economic and racial, ethnic, and linguistic categories.

For the FY 2007 Postsecondary topic, applicants must submit under *either* Goal One *or* Goal Two *or* Goal Three *or* Goal Four *or* Goal Five. More details on the requirements for each goal are listed in the section on General Requirements of the Proposed Research. In this section, specific requirements that apply to applications to the Postsecondary topic are described.

(i)   Under Goal One applicants should seek to identify programs, practices, or policies and conditions that are associated with and are potential determinants of postsecondary enrollment, retention, and graduation. The understanding identified through Goal One awards is expected to be relevant to the design and implementation of future interventions. The typical methodology

for Goal One will be the analysis of existing databases, including state or district longitudinal databases, using statistical approaches that allow for testing models of the relationships among variables in ways that strengthen hypotheses about paths of influence in postsecondary access and retention. Existing datasets can be supplemented with additional data if it would be advantageous to the research program. Goal One is limited to the examination of programs, practices, or policies that are implemented at the postsecondary level or in high school where the intent is to increase access to postsecondary education or support the transition into postsecondary education.

(ii)   Goals Two through Four can be seen as a progression from development (Goal Two) to efficacy (Goal Three) to effectiveness at scale (Goal Four). Applicants proposing to develop new interventions should apply under Goal Two. Under Goal Three, the Institute will accept proposals to conduct efficacy or replication trials of interventions. Goal Four targets evaluations of the effectiveness of interventions implemented at scale.

Applicants proposing to develop or evaluate programs, practices, or policies under the Postsecondary Education Research program must target interventions implemented at the high school or postsecondary level that are intended to increase access to postsecondary education, support the transition from high school into postsecondary education, or improve the persistence of students in postsecondary education. Additional requirements for applications submitted under Goal Two or Goal Three or Goal Four are described in sub-sections of the General Requirements of the Proposed Research section.

(iii)   Under the Postsecondary topic, Goal Five addresses measures of learning at the postsecondary level.

(1)   *Purpose of Postsecondary Goal Five proposals.* Through Goal Five, the Institute intends to support the development and/or validation of measures used by institutions of higher education to assess what students have learned in college – including, for example, college-level proficiencies in reading, writing, critical thinking, and mathematics.

(2)   *Requirements of proposed assessments.* Applicants should provide a compelling rationale to support the development and validation of a new assessment or validation of an existing assessment. Reviewers will consider the strength of the theoretical foundation for the proposed assessment, the existing empirical evidence supporting the proposed assessment, and whether the proposed assessment duplicates existing assessments. Applicants should clearly describe the components of the assessment (e.g., specific knowledge and skills that the instrument is designed to tap). When applicants clearly describe the components of the assessment, reviewers are better able to evaluate the relation between the theoretical and empirical foundation for the assessment and the assessment itself (e.g., does the proposed assessment capture critical skills?). By clearly describing the components of the assessment, reviewers are better able to judge whether the proposed assessment will meet the needs for which it is intended. Applicants proposing to examine the validity and utility of existing assessments should document the current use of the assessment.

When proposing assessments, researchers should keep in mind the pragmatic constraints (e.g., costs, ease of administration) that determine whether the instrument is a viable option for use by colleges or other education entities.

By describing the theoretical and empirical support for the proposed assessment, the practical utility of the assessment, and the components of the assessment, applicants are addressing aspects of the significance of their proposal.

(3)   _Methodological requirements._ Applicants should detail the proposed procedures for developing the assessment instrument; selecting items to be used in the assessment; assessing difficulty of selected items; and obtaining representative responses to items. Applicants should clearly describe the research plans for determining the validity and reliability of the instrument. Applicants should also examine the predictive validity of assessments.   Applicants should describe the characteristics and size of samples to be used in each study, procedures for collecting data, measures to be used, and data analytic strategies.

(4)   _Personnel and resources._ Competitive applicants will have research teams that collectively demonstrate expertise in (a) the research program including the content areas, research design, and assessment, (b) implementation of, and analysis of results from, the research design that will be employed, and (c) working with teachers, schools, districts or other education delivery settings in which the proposed assessment might be used. Competitive applicants will have access to institutional resources that adequately support research activities and access to schools in which to conduct the research.

(5)   _Awards._ Typical awards under Goal Five will be $150,000 to $400,000 (total cost = direct + indirect costs) per year for a maximum of 4 years. Larger budgets will be considered if a compelling case can be made for such support. The size of award depends on the scope of the project.
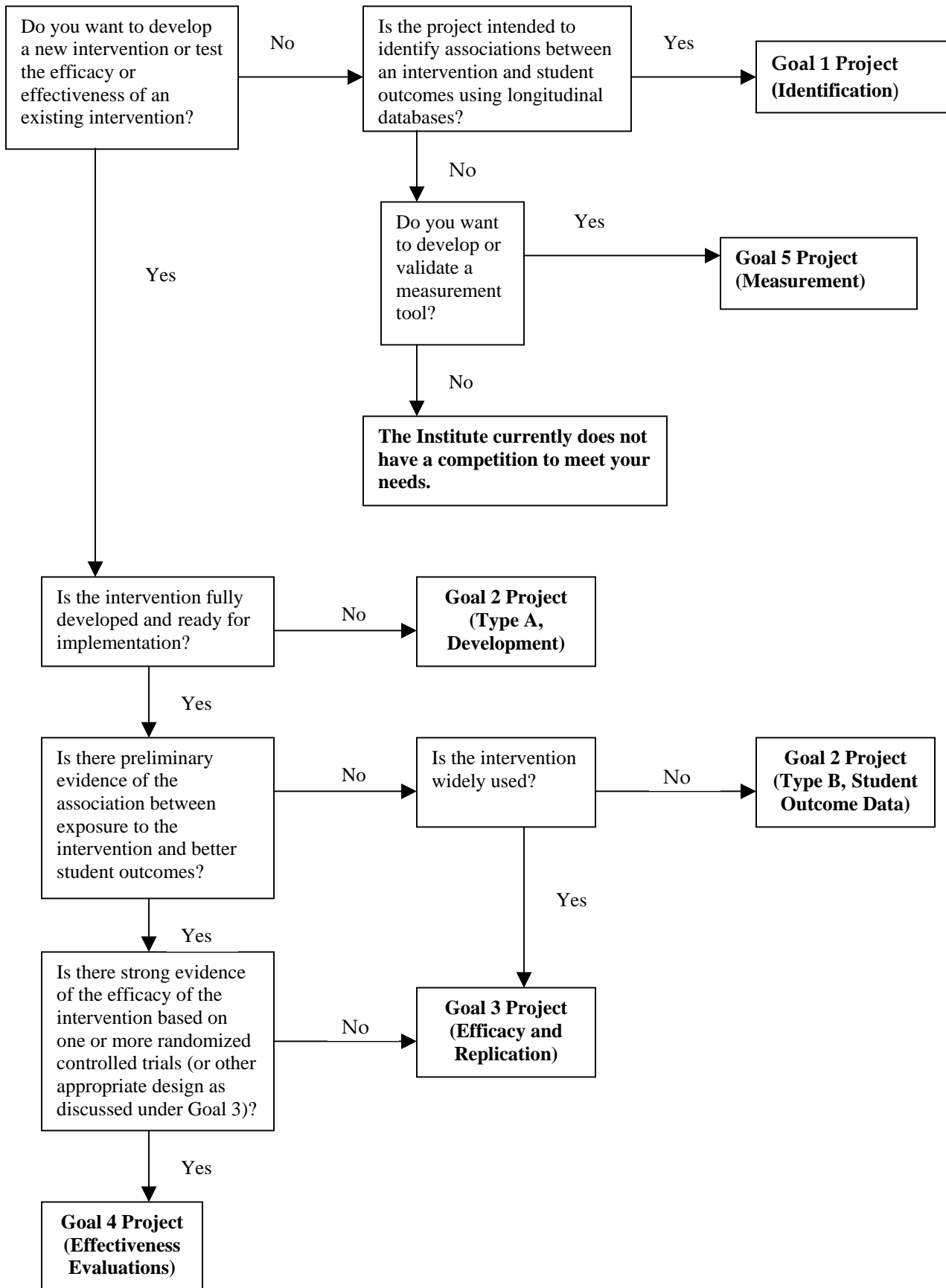
PART IV REQUIREMENTS FOR PROPOSED RESEARCH

5. GENERAL REQUIREMENTS OF THE PROPOSED RESEARCH

A. Basic Requirements

a. ***Resubmissions***. Applicants who intend to revise and resubmit a proposal that was submitted to one of the Institute's FY 2006 competitions but that was not funded must indicate on the application form that their FY 2007 proposal is a revised proposal. Their FY 2006 reviews will be sent to this year's reviewers along with their proposal. Applicants should indicate the revisions that were made to the proposal on the basis of the prior reviews using no more than 3 pages of Appendix A.

b. ***Applying to multiple topics***. Applicants may submit proposals to more than one of the Institute's FY 2007 competitions or topics. In addition, within a particular competition or topic, applicants may submit multiple proposals. However, applicants may submit a given proposal only once (i.e., applicants may not submit the same proposal or very similar proposals to multiple topics or to multiple goals in the same topic or to multiple competitions). If the Institute determines prior to panel review that an applicant has submitted the same proposal or very similar proposals to multiple topics within or across competitions and the proposal is judged to be compliant and responsive to the submission rules and requirements described in the Request for Applications, the Institute will select one version of the application to be reviewed by the appropriate scientific review panel. If the Institute determines after panel review that an applicant has submitted the same proposal or very similar proposals to multiple topics within or across competitions and if the proposal is determined to be worthy of funding, the Institute will select the topic under which the proposal will be funded.

c. ***Applying to a particular goal within a topic***. To submit an application to one of the Institute's research programs, applicants must choose the specific goal under which they are applying. Each goal has specific requirements.

d. ***Determining which goal is most appropriate for the proposed project***. Applicants should read carefully the requirements for each Goal and the examples of appropriate projects under each Goal. The Institute strongly encourages potential applicants to contact the relevant program officer listed in [Section 18](#) if they have any questions regarding the appropriateness of a particular project for submission under a specific goal. In the past, many applicants have had questions deciding between Goal Two (Development) and Goal Three (Efficacy and Replication Trials) and between Goal Three and Goal Four (Effectiveness Evaluations). Applicants may find the following decision tree useful for guiding their thinking.

e. ***Postdoctoral research training grant applications***.   The requirements for the Postdoctoral Research Training topic are listed in Section 3.G.b. *[Specific requirements for applications submitted to the Postdoctoral training topic](#)*.

Deciding Among Goals One, Two, Three, Four, and Five

Do you want to develop a new intervention or test the efficacy or effectiveness of an existing intervention?	—No→ Is the project intended to identify associations between an intervention and student outcomes using longitudinal databases?	—Yes→ **Goal 1 Project (Identification)**

No ↓

Do you want to develop or validate a measurement tool? —Yes→ **Goal 5 Project (Measurement)**

No ↓

The Institute currently does not have a competition to meet your needs.

Yes ↓ (from first box)

Is the intervention fully developed and ready for implementation? —No→ **Goal 2 Project (Type A, Development)**

Yes ↓

Is there preliminary evidence of the association between exposure to the intervention and better student outcomes? —No→ Is the intervention widely used? —No→ **Goal 2 Project (Type B, Student Outcome Data)**

Yes ↓ (from "widely used") → **Goal 3 Project (Efficacy and Replication)**

Yes ↓ (from preliminary evidence)

Is there strong evidence of the efficacy of the intervention based on one or more randomized controlled trials (or other appropriate design as discussed under Goal 3)? —No→ **Goal 3 Project (Efficacy and Replication)**

Yes ↓

Goal 4 Project (Effectiveness Evaluations)

B. Requirements for Goal One (Identification Projects)
Because the requirements for Goals One through Four are essentially the same across the Institute's research grant topics, a generic description is used in the funding announcement. Consequently, the examples provided may not apply to a particular topic.

a. *Purpose of identification studies*. Through all of its research programs that include the Identification goal (Goal One), the Institute is primarily interested in analyses of multivariate data, such as longitudinal individual student data that exist in a number of federal-, state-, and district-level databases, to identify existing programs, practices, and policies that may be associated with better academic outcomes, and to examine factors and conditions that may mediate or moderate the relations between student outcomes and these programs, practices, and policies.

For Goal One, the Institute typically expects investigators to use existing longitudinal data sets to capitalize on natural variation or discontinuities in education practices or policies.   For example, in a particular year, a large district might have implemented a policy to hire master reading teachers for elementary schools. An investigator might propose interrupted time series analyses of the district's longitudinal datasets to examine changes in student outcomes that follow the implementation of the new policy. As a second example, with a state database linking individual student scores on annual reading assessments with teacher characteristics, an investigator might propose to analyze the relationship between teacher professional development and reading outcomes, controlling or accounting for other characteristics of students and teachers. As a third example, an investigator might use a state database of school performance over time to identify sets of schools with similar demographics but dramatically different student outcomes of state assessments of mathematics. Using existing sources of administrative data, and perhaps collecting new data through survey instruments, the investigator would attempt to identify distinctive features of the higher and lower performing schools.

As an alternative to analyzing existing longitudinal databases, applicants who are interested in investigating programs, practices, and policies that may be associated with better academic outcomes could propose to conduct a small scale descriptive longitudinal study with primary data collection. In such cases, applicants would collect and analyze their own data, rather than analyze already existing data. However, applicants should keep in mind the limited timeframe and budget of typical Goal One projects (see section d below).

Value-added analyses can often strengthen the conclusions drawn from traditional multivariate analyses. Value-added analyses use gain scores for individual students to control for student characteristics when estimating the effects of other variables. For example, the analysis of the relationship between teacher professional development and reading outcomes described previously would be more persuasive if individual student outcomes in a particular year were adjusted for student scores on the same or a similar assessment at the end of the previous school year.

The strongest approaches to statistical modeling of multivariate data involve testing two or more models of relationships using the same data. Because multivariate analyses cannot fully adjust for selection biases and the effects of variables that were not measured or were not measured well, they are seldom if ever sufficient to support strong causal conclusions about what works. However, when two or more models of relationships among variables are tested with the same data, it may be possible to determine that one is more plausible than another, thus providing information relevant to understanding what does

not work, as well as what does work. That, in turn, can direct future efforts in avenues that are more likely to be productive.

Evidence obtained through a Goal One project of the association between exposure to a program, practice, or policy and better student outcomes has the possibility of being used to support a subsequent application for a Goal Two (Development) or Goal Three (Efficacy) project.

By addressing the theoretical and empirical rationale for the study and the practical importance of the intervention (e.g., policy, program) that will be examined, Goal One applicants are addressing aspects of the significance of their proposal.

b. *Methodological requirements*. For all applications, including those submitted under Goal One, the proposed research design must be appropriate for answering the research questions or hypotheses that are posed.

(i)   *Database*. The applicant should describe clearly the database(s) to be used in the investigation including information on sample characteristics, variables to be used, and ability to ensure access to the database if the applicant does not already have access to it. The database should be described in sufficient detail so that reviewers will be able to judge whether or not the proposed analyses may be conducted with the database. If multiple databases will be linked to conduct analyses, applicants should provide sufficient detail for reviewers to be able to judge the feasibility of the plan. If the applicant does not currently have access to the databases needed for the study, the applicant should provide sufficient documentation (e.g., letters of agreement) to assure reviewers that access can be obtained and the project can be carried out in a timely fashion.

          The applicant should describe the primary outcome measures to be used, including reliability and validity. In particular, applicants should provide sufficient information on the construct validity of the proposed measures. For example, if the applicant proposes to use a state database from which the primary outcome measure will be high school dropout rates, the applicant should detail how the high school dropout rates will be derived.

(ii)   *Primary data collection (optional)*. For some projects, applicants may need to collect original data; these data will generally be used to supplement an existing longitudinal database in order to answer the question of interest; other applicants may choose only to collect and analyze original data. In such cases, the application must detail the methodology and procedures proposed for the primary data collection. Applicants should describe the sample and how the sample is related to or links to the proposed secondary database, the measures to be used (including information on the reliability and validity of the proposed instruments), and data collection procedures.

(iii)   *Data analysis*. The applicant must include detailed descriptions of data analysis procedures. Because predictor variables relevant to education outcomes (e.g., student characteristics, teacher characteristics, school and district characteristics) often covary, the Institute expects investigators to utilize the most appropriate state-of-the-art analytic techniques to isolate the possible effects of variables of interest. Analytic strategies should allow investigators to examine mediators and moderators of programs and practices. The relation between hypotheses, measures, independent

and dependent variables should be well specified. Strong applications will include an explicit discussion of how exclusion from testing, or missing data, will be handled within the statistical analyses. Strong applications will propose an approach for comparing hypotheses or models of relationships among variables.

c. *Personnel and resources*. Competitive applicants will have research teams that collectively demonstrate expertise in (a) the relevant academic content area (e.g., reading, mathematics), including where applicable, teacher education; and (b) implementation of, and analysis of results from, the research design that will be employed. Competitive applicants will have access to institutional resources that adequately support research.

d. *Awards*. Typical awards for projects at this level are $100,000 to $250,000 (total cost = direct + indirect costs) per year for a maximum of 2 years. The size of the award depends on the scope of the project.

C. Requirements for Goal Two (Development Projects)
a. *Purpose of Goal Two (Development).* Through all of its research programs that include the Development goal (Goal Two), the Institute intends to support the development of interventions – curricula, instructional approaches, programs, and policies. From the Institute's standpoint, a funded development project would be successful if at the end of the 2 to 4 year development award, the investigators had a fully developed version of the proposed intervention, including for example, materials for students and teachers and pilot data showing a positive correlation between exposure to the intervention and student outcomes. The Institute anticipates that investigators with successful development projects would submit proposals to subsequent competitions for Goal Three (Efficacy) awards. Thus, Goal Two applicants should be aware that the type of data they propose to collect under Goal Two awards should prepare them to apply for Goal Three awards. That is, for most interventions to qualify for Goal Three projects, they must have student outcome data such that exposure to the intervention is associated with better student outcomes. The exception is under Teacher Quality and Education Leadership topics and pertains to interventions administered as part of preservice training for future teachers or education leaders (details for this exception are described below at the end of the Requirements for proposed intervention section, in the measures section, and under Goal 3).

b. *Requirements for proposed intervention*. Under Goal Two, the Institute considers two types of projects: Type A projects and Type B projects. First, the Institute will consider applications to develop new interventions or further develop interventions that are in the early stages of development (e.g., those that do not have an entire curriculum ready to evaluate). Such projects are referred to as **Type A** projects under Goal Two. For Type B projects, applicants must have a fully developed intervention and propose to collect pilot data that includes student outcome measures. Type B projects are further described at the end of this subsection.

Under Goal Two, it is important for applicants to provide a strong rationale to support the development of the proposed intervention (e.g., curriculum, instructional practice, teacher professional development program, professional development delivery model). Reviewers will consider whether there is a strong theoretical foundation for the proposed intervention, and whether the proposed intervention is grounded in empirical research. For example, a proposed reading intervention might be based on data obtained through laboratory experiments or classroom studies on the use of a particular comprehension strategy in

understanding expository text. The rationale for the design of a curriculum might include empirical research by cognitive scientists on knowledge acquisition of complex text-based information. In other cases, applicants might have already developed some components of the intervention and have pilot data showing the correlation between student outcomes and exposure to specific components of the proposed intervention. In such cases, the proposed project might be to complete the development of the intervention and obtain pilot data on the relation between exposure to intervention and student outcomes. Alternatively one could imagine a proposal to develop and implement an intervention for struggling high school readers that is based on an intervention developed for upper elementary school students. Part of the empirical justification for developing this particular intervention for struggling adolescent readers might be that the original intervention for elementary school students had been evaluated through a study that employed random assignment and was found to be efficacious for improving reading comprehension among elementary school students. In this case, the applicant would be proposing to modify this existing intervention to make it appropriate for high school students who are struggling readers, and to collect data on the relation between exposure to the modified intervention and student outcomes. Applicants should clearly and concisely articulate why the proposed intervention, as opposed to some other type of intervention, should be developed. *Why is the proposed intervention likely to be successful for improving student learning and achievement?*

In the rationale to support the proposed intervention, applicants should address the *practical* importance of the proposed intervention. For example, when the proposed intervention is fully developed, will it form a set of math instructional strategies that has the potential to improve students' mathematics test scores in educationally meaningful increments, if it were implemented over the course of a semester or school year? Is the planned intervention sufficiently comprehensive, for instance, to address multiple types of difficulties that students encounter in mastering algebra and to lead to improvements in students' grades or mathematics achievement test scores? If the proposed intervention focuses on academic content, how does the academic content (e.g., high school physics) proposed in the intervention relate to state standards for that domain? In addition, would the proposed intervention be both affordable for schools and easily implemented by schools (e.g., not involve major adjustments to normal school schedules)? Appropriate applications for Goal Two may include, for example, proposals to develop and test curriculum materials that ultimately could be combined to form a complete stand-alone curriculum for a grade. Also appropriate would be proposals to develop supplementary materials that would be used in conjunction with existing stand-alone curricula.

Applicants should clearly describe the components of the intervention and how they relate to each other temporally (or operationally), pedagogically (e.g., in a scope and sequence), and theoretically (e.g., why does A lead to B). When applicants clearly describe the model that guides the intervention and the specific components making up the intervention, reviewers are better able to evaluate the relation between the theoretical and empirical foundation for the intervention and the intervention (e.g., is the proposed intervention a reasonable operationalization of the theory?). Reviewers are also better able to evaluate the relation between the intervention and the outcome measures (e.g., do the proposed measures tap the constructs that the intervention is intended to address?). Because it is rare for students in comparison conditions to receive no educational program, strong applications include data on, or review research describing, the attributes of typical, existing practices. Understanding the shortcomings of current practice contributes to the rationale for the proposed intervention. By clearly describing the components of the intervention – particularly, the unique features of the intervention – as well as the instruction that students in the comparison group will receive, reviewers are better able to judge whether

the proposed intervention is sufficiently different from what students typically receive to potentially generate differential outcomes.

The Institute recognizes there are some fully developed interventions that would not qualify for investigation under Goal Three because there are no student outcome data demonstrating the association between exposure to the intervention and better student outcomes nor is there wide-spread use of the intervention. In such cases, applicants may apply under Goal Two for support to conduct a small study to obtain pilot data on the association between exposure to the intervention and student outcomes. These projects are referred to as **Type B** projects under Goal Two. **Such projects are limited to a maximum of 2 years of support because the Institute expects the investigator to be ready to implement the intervention in schools or other education delivery settings at the beginning of the award period**. The applicant should clearly state in the beginning of the research narrative that he or she is applying under Goal Two with a fully developed intervention that has not been previously evaluated using student outcome measures. As with all Goal Two applications, the applicant should describe the empirical and theoretical rationale that indicates why the proposed intervention is likely to be successful for improving student learning and achievement. The applicant should articulate the practical importance of the intervention. That is, applicants proposing Type B projects should articulate the theoretical, empirical, and practical reasons that justify investing research dollars to study the proposed intervention. In addition, because of the short timeframe, Type B applicants should be aware that strong applications show a proper balance of effort across implementation, data collection, data analysis, and documentation/write-up of the study.

By addressing the theoretical and empirical support for the proposed intervention and the practical importance of the intervention, Goal Two applicants are addressing aspects of the significance of their proposal. Projects can be costly because of the type of intervention being developed (e.g., intelligent tutors), and because of the data collection and research methods used. In all cases, the significance of the proposal should justify this expense (e.g., does the theoretical and empirical support for the proposed intervention suggest that substantively important effects will be obtained if the intervention is implemented?).

Applicants deciding whether their proposal is more appropriate for Goal Two or Goal Three or Goal Four may find the decision tree to be useful.

c. *Methodological requirements*. **For all applications, including those submitted under Goal Two, the proposed research design must be appropriate for answering the research questions or hypotheses that are posed. For Type A projects under Goal Two, the proposed research must also be appropriate for providing empirical data to guide the development and refinement of the intervention.**

For Goal Two projects involving the development of an intervention (Type A projects), there are two aspects of the research methodology that applicants must clearly address: (a) the proposed methods for developing the intervention and (b) the proposed research methods for obtaining evidence of the *relation between exposure to* the proposed intervention and student outcomes. Goal Two applicants whose intervention is already developed (Type B projects) should present the proposed methods for obtaining evidence of the relation between exposure to the proposed intervention and student outcomes.

For Type A Development projects, investigators are proposing to develop a new intervention (e.g., curriculum, instructional approach, professional development program). In such cases, applicants should describe the process they will use to collect empirical (but not necessarily experimental) data that will provide feedback for refining specific components of the intervention. What data will be collected to determine the feasibility of the components of the intervention and how the components work? Are some components harder to implement than others? As an example, suppose an applicant proposes to develop a reading comprehension curriculum in which a number of comprehension strategies are presented to middle school students. Some components might initially be pilot tested with small groups of students outside of a classroom context. Some components might be implemented in the classroom with the researcher conducting detailed observations on students and teachers as the components are implemented in the context of actual lessons. The researchers could propose to interview or conduct focus groups with teachers who pilot the initial and revised version of each unit to obtain feedback on feasibility of implementation, the amount of time required for teaching each lesson, and difficulties encountered during instruction, as well as obtaining suggestions for improving the materials. A variety of methodological strategies might be employed during this phase. *Applicants should describe the iterative development process to be used in the design and refinement of the proposed intervention and plans for acquiring evidence about the operation of the components in the model that they described.*

By the end of a Goal Two project (Type A and Type B), the Institute expects investigators to have obtained and analyzed student outcome data testing whether exposure to the intervention is positively, negatively, or not correlated with student performance, and to have obtained an estimate of the size of the effect. For Goal Two projects, acceptable designs include nonequivalent comparison group quasi-experiments and experimental designs. While designs that include some type of comparison group are desirable, they are not necessary for Goal Two Projects. For example, an applicant could propose a simple one-group pre-post design in which change in the outcome from pretest to posttest for students who received the intervention is compared to normative change in the outcome over a similar time period.

An example of an acceptable design for obtaining evidence of the relation between exposure to the proposed intervention and student outcomes is one in which the applicant (a) has 8 to 10 teachers implement a new reading curriculum designed to improve reading comprehension, and (b) obtains scores on the district's standardized reading achievement test for students who received the intervention and for students in comparable classrooms in the same district who did not receive the intervention. This example is a nonequivalent comparison group post-test only quasi-experimental design. In this example, a strong application would match the intervention and comparison groups on demographic and outcome variables. If the *prior* year's district end-of-year reading achievement test scores are available for both the treatment group students and the matched nonequivalent comparison group students, the investigator could improve on the basic design by using the prior year's scores as a pre-test. The investigator could calculate an effect size measuring the difference in the district's end-of-year reading achievement test scores for the treatment group versus the matched non-experimental comparison group. An applicant following this example might include other reading comprehension measures that may be more sensitive to the proposed intervention. In order to keep the scope of the project appropriate to a Development award, the applicant would only collect these additional data on students in the intervention group.

This research design has the advantage of allowing the investigator to observe the implementation of the intervention in several classrooms while keeping the scope (and costs) of the project appropriate for awards for a development project. This design also capitalizes on those situations in which data for a non-experimental comparison group are available from assessment data collected by the district. This design does *not* involve random assignment of students or classrooms to different treatment conditions. The Institute recognizes that such data do *not* provide causal evidence of the impact of the intervention on student outcomes. However, the purpose of the Development goal is to provide funds to develop interventions that on the basis of the theoretical rationale and relevant prior empirical evidence appear to have the potential to improve student learning and to collect pilot data that would permit a reasonable evaluation of whether or not the intervention has sufficient potential for improving student outcomes to merit further investment – that is, to determine if there are *potentially positive outcomes* associated with exposure to the intervention.

An example of an alternative design for testing a newly developed intervention (e.g., a new instructional approach) that is also acceptable is one in which the applicant randomly assigns 4 to 5 classrooms to the new intervention and 4 to 5 classrooms to the comparison condition in which teachers teach their class as they have in the past; pretest and posttest data are collected for students in both groups. This design has some advantages over the previous example and some disadvantages. This design takes advantage of the benefits of random assignment experimental designs for making causal inferences. One disadvantage to this design is that the small number of classrooms assigned to each condition is not likely to be sufficient for obtaining statistical significance for appropriate tests of the effect of the intervention.

Through Goal Two projects, the Institute will fund projects to develop interventions and to obtain pilot data to determine whether or not the intervention as initially developed warrants the substantial investment required to conduct an efficacy study under Goal Three. By providing these two examples – one non-experimental study involving primary data collection in 8 to 10 classrooms and one experimental study involving primary data collection in 8 to 10 classrooms – the Institute is providing guidance to applicants on the scope of projects that the Institute intends to support under Goal Two as Development projects. Goal Two projects are *not* intended to provide evidence on the *efficacy* of the proposed interventions (see the Institute's definition of efficacy under Goal Three). Goal Two studies, unlike efficacy studies, are intended to show that an intervention is promising. That means that results are in the expected direction. The Institute expects these research designs to be as strong as possible, including appropriate matching of students and statistical analyses. However, the Institute also understands and expects that, within the limited budget of Goal 2 projects, many such designs will be underpowered (i.e., unable to detect an effect as statistically significant using traditional probability levels and random effects assumptions). This may be particularly true when applicants choose to demonstrate the promise of an intervention with an experimental or quasi-experimental design that involves treatments at the classroom or building level. The Institute recommends that applicants first describe their research design, detail their analysis plan, and indicate what the power would be if they calculated it appropriately (e.g., taking clustering into account, using the appropriate unit of analysis). Second, applicants may describe (a) an analysis plan that treats the clusters (i.e., classroom or school) as fixed effects and what the power would be under these conditions or (b) an analysis plan that treats the clusters as random effects, but uses a more liberal significance level than the conventional $\alpha = .05$ (e.g., $\alpha = .25$). In doing so, applicants should also indicate the limitations to their ability to draw conclusions

based on this analysis.   Strong applications will include confidence intervals for treatment effects (or treatment effect sizes) computed considering clusters as random effects.

The Institute anticipates that the data obtained through some Goal Two projects will show sufficiently strong associations between exposure to the developed intervention and student outcomes to support a subsequent application for a Goal Three (Efficacy) award. Data from other projects might lead researchers to apply for a second Goal Two award to further develop or refine their intervention. Data from still other projects might indicate that the overall approach should be changed; that is, the intervention does *not* appear to be promising. In such cases, the researchers might use that knowledge to develop a different intervention. In addition, there may be instances in which researchers successfully complete a Development project to create, for example, curriculum modules to cover one semester of a science curriculum and have obtained data demonstrating a positive correlation between exposure to the curriculum and student outcomes with empirical evidence. Over the course of the project the investigators may decide that before they apply for an Efficacy project they want to develop enough modules to complete a science curriculum for the entire academic year, rather than for just one semester. The Institute considers it appropriate for such researchers to apply for a second Development project.

Finally, the Institute recognizes that for some of its topics improving student outcomes is a more distal outcome. For example, in the Teacher Quality and Education Leadership programs, changing the behaviors of the teacher or education leader is a proximal outcome and student outcomes are distal outcomes. For applicants who are proposing to develop and obtain pilot data for professional development interventions, both data on observed behaviors of teachers/education leaders and their students must be obtained. However, the Institute recognizes that for pre-service interventions, there may not be sufficient time and resources to follow, for example, pre-service teachers into their subsequent jobs and obtain follow-up data on their students. When it is not possible under the time constraints of the award (i.e., 4-year limit for Type A awards, 2-year limit for Type B awards) to obtain student outcome data because the intervention targets pre-service teachers/education leaders, the Institute encourages applicants to include measures of teacher/education leader behaviors that have been associated with student outcomes in the research literature, in addition to other teacher/education behaviors that are selected for other theoretical and empirical reasons. Applicants choosing this option should provide sufficient information to convince reviewers that demonstrating change on such measures is likely to be associated with change in student outcomes.

(i)   *Sample*. The applicant should define, as completely as possible, the sample to be selected and sampling procedures to be employed for the proposed study. Additionally, if the applicant proposes a longitudinal study, the applicant should show how the long-term participation of those sampled would be assured.

(ii)   *Design*. The applicant must provide a detailed research design. For Goal Two projects involving the development of an intervention (Type A projects), applicants should clearly describe: (a) the proposed methods for developing the intervention and (b) the proposed research methods for obtaining evidence of the *relation between exposure to* the proposed intervention and student outcomes. Goal Two applicants whose intervention is already developed (Type B projects) should present the proposed methods for obtaining evidence of the relation between exposure to the proposed intervention and student outcomes.

(iii)   *Measures*. For all proposals under Goal Two, investigators must include measures of relevant student outcomes (e.g., measures of reading or mathematics achievement). Applicants to the Teacher Quality and Education Leadership topics must include behavioral measures of the teachers or leaders who are the target of the intervention, as well as measures of student learning and achievement. As noted above, the Institute recognizes that applicants under Teacher Quality and Education Leadership who are proposing to develop and assess interventions that are administered as part of *preservice* training for future teachers or education leaders may not have sufficient time within the constraints of the award period to follow the preservice teachers and leaders into their first positions and obtain data on their students. In such instances, applicants should include measures of teacher/education leader behaviors that have been associated with student outcomes and provide sufficient justification to assert that demonstrating change on these proximal measures is likely to be associated with change in student outcomes.

The applicant should provide information on the reliability and validity of the selected measures and justify the appropriateness of the proposed measures.

All applicants should note that data that only describe *process* (e.g., observations of student behavior during planned lessons, case study of the implementation of the curriculum, a discourse analysis of classroom discussions) or data only on teacher or student perception of improvement or ease of use will *not* be considered as sufficient evidence of the potential efficacy of the intervention.

(iv)   *Process data*. Although the applicant must include relevant student outcome data to address the question of potential efficacy, this requirement does *not* preclude the collection of process data. In fact, the Institute encourages the collection of such data, which can help the researcher refine the intervention and provide insight into why an intervention does or does not work, and is or is not well implemented. Observational, survey, or qualitative methodologies are encouraged as a complement to quantitative measures of student outcomes to assist in the identification of factors that may, for example, explain the effectiveness or ineffectiveness of the intervention or identify conditions that hinder implementation of the intervention.

(v)   *Data analysis*. The applicant must include detailed descriptions of data analysis procedures. For quantitative data, specific statistical procedures should be cited. The relation between hypotheses, measures, independent and dependent variables should be clear. For qualitative data, the specific methods used to index, summarize, and interpret data should be delineated.

d. *Personnel and resources*. Competitive applicants will have research teams that collectively demonstrate expertise in (a) specific academic domain (e.g., reading, mathematics or science, and if applicable, teacher education); (b) implementation of, and analysis of results from, the research design that will be employed; and (c) working with teachers, schools, or other education delivery settings that will be employed. Competitive applicants will have access to institutional resources that adequately support research activities and access to education delivery settings in which to conduct the research.

An applicant may involve *for-profit entities* in the project. Involvement of the commercial developer or distributor must not jeopardize the objectivity of the evaluation. *Collaborations including for-profit developers or distributors of education products must justify the need for Federal assistance to*

undertake the evaluation of programs that are marketed to consumers and consider cost-sharing part of the cost of the evaluation.

e. *Awards*. Typical awards for projects at this level are $150,000 to $500,000 (total cost = direct + indirect costs) per year. Type A projects are for a maximum of 4 years; Type B projects are for a maximum of 2 years.   In all cases, the size of the award depends on the scope of the project.

D. Requirements for Goal Three (Efficacy and Replication Trials)

Under Goal Three, the Institute requests proposals to test the efficacy of fully developed interventions that already have evidence of potential efficacy. By *efficacy*, the Institute means the degree to which an intervention has a net positive impact on the outcomes of interest in relation to the program or practice to which it is being compared.

a. *Purpose of efficacy and replication trials*. Through all of its research programs that include the Efficacy and Replication goal (Goal Three), the Institute intends to fund efficacy trials to determine whether or not fully-developed interventions – programs, practices, policies – are effective under specified conditions (e.g., large urban high school with large class sizes and high turnover rate among teachers) and with specific types of students (e.g., low income or high proportion of English language learners). Results from efficacy projects have less generalizability than results from effectiveness trials under Goal Four. The limited generalizability can arise both from the lack of a full range of types of settings and participants in the study, as well as through the intensive involvement of the developers and researchers in the implementation of the intervention. A well designed efficacy trial provides evidence on whether an intervention **can** work, but not whether it would work if deployed widely. Under Goal Three, applicants may propose an efficacy trial to determine if an intervention will work under specific conditions or a replication trial to determine if an intervention shown to produce a net positive impact in one setting will produce a net positive impact in a different setting or with a different population of students.

Under Goal Three, an applicant might propose to examine the efficacy of the intervention in an experimental study in which half of the classrooms are randomly assigned to the intervention condition and half of the classrooms are assigned to continue to use the district's standard curriculum. If the research team hypothesized that level of teacher professional development would meaningfully affect implementation and student outcomes, the team might propose instead to randomly assign one-third of the classrooms to an intervention condition in which teachers receive a training workshop for implementing the treatment curriculum at the beginning of the year, one-third of the classrooms to an intervention condition in which teachers receive the training workshop on implementation of the treatment curriculum with follow-up coaching sessions during the year, and one-third of classrooms to continue to use the district's standard curriculum. *Applicants should use the efficacy and replication trials to determine the conditions, if any, under which an intervention produces meaningful improvement on academic outcomes.*

Also of interest to the Institute are proposals to compare the impact of two interventions that are based on different theoretical models. In such cases, the purpose might be to compare the efficacy of two well-developed approaches to improving student learning. One advantage to this approach is that, relative to designs in which the comparison group experiences whatever the school or district currently provides (but see the discussion of "business-as-usual" treatments below), the investigator should have

better knowledge of the critical components of each intervention and can attempt to create two conditions in which, for example, students receive instruction that differs on a number of critical instructional components.

Efficacy projects that involve random assignment at the school-level are likely to be quite costly. When schools are the unit of assignment, it is acceptable for applicants to increase the power of their design and reduce the requisite number of schools by conducting an analysis that treats schools as a fixed effect. Applicants should first describe their design, detail their analysis plan, and indicate what the power would be if schools were treated as a random effect. Applicants should then describe an analysis plan that treats schools as fixed effects and indicate what the power would be under these conditions. Treating schools as fixed effects limits the generalizability of the findings. In cases in which research finds significant effects using a fixed effects model but there is insufficient power to obtain effects using a random effects model, the Institute encourages investigators to apply for subsequent funding to replicate their efficacy studies to build the generalizability of the findings.

From the Institute's standpoint, a funded Efficacy/Replication project would be *methodologically successful* if at the end of the grant period, the investigators had rigorously evaluated the impact of a clearly specified intervention on relevant student outcomes and under clearly described conditions using a research design that meets the Institute's What Works Clearinghouse standards (http://whatworks.ed.gov) whether or not the intervention is found to improve student outcomes relative to the comparison condition. The Institute would consider methodologically successful projects to be *pragmatically successful* if the rigorous evaluation determined that the intervention has a net positive impact on student outcomes in relation to the program or practice to which it is being compared.

b. *Requirements for proposed intervention*. Interventions appropriate for study under Goal Three may be (i) interventions that are fully developed and have evidence of the potential efficacy of the intervention or (ii) interventions that are already widely used within one or more states but have not been rigorously evaluated.

(i) For interventions that are *not* already in wide use, applicants must have an intervention that is fully developed and ready to be evaluated. Applicants who intend to devote a significant part of the project period to developing new components or materials for the intervention (e.g., additional curriculum modules, materials to train teachers to use the intervention curriculum) or new delivery approaches (e.g., material that was delivered by a teacher is proposed to be delivered via computer) should apply to Goal Two. Goal Three projects are limited to those interventions that are fully developed and have all materials (including teacher training programs) ready for implementation.

For interventions that are *not* already in wide use, applicants must provide a compelling rationale for the use of the intervention that includes (1) a strong theoretical foundation and (2) empirical evidence of the association between exposure to the intervention and better student outcomes. As part of the description of the theoretical basis for the intervention, the applicant should detail how the components of the intervention operationalize the tenets of the theory. A strong theoretical rationale will make clear which features of the intervention are the critical features that need to be well-implemented in order to obtain improvement in student outcomes.

Applicants should clearly detail the empirical evidence in support of the intervention. For example, empirical evidence to justify an evaluation of the intervention could consist of data based on a single-group, pre-test/post-test study showing an increase in scores on a standardized measure for which there are existing data on typical gains in scores over a comparable period of time. As part of the justification for considering the proposed intervention, the applicant might show that the pre-intervention to post-interventions gains on the standardized measure are comparable to, if not better than, gains that have been observed in other studies. Alternatively, empirical justification could be data obtained from a small quasi-experimental study in which the intervention was implemented in 6 to 8 classrooms and students' end-of-year achievement test scores are compared to the scores of demographically comparable classrooms within the same district. Such a study would be under-powered for most interventions and outcomes, so it is the effect size rather than statistical significance of the difference that would be most informative. Furthermore, information on effect sizes is more useful to reviewers when sufficient context for interpreting the effect sizes is provided. For example, how does the size of the obtained effect compare to the amount of growth one would expect over an academic year for students at that grade-level and in that domain?

As noted above under Goal Two, the Institute recognizes that applicants under Teacher Quality and Education Leadership who are proposing to evaluate interventions that are administered as part of *preservice* training for future teachers or education leaders may not have student outcome data to show an association between exposure to the preservice training intervention and outcomes of students of those teachers/education leaders who participated in that preservice training. In such instances, applicants should demonstrate associations between exposure to the preservice intervention and measures of teacher/education leader behaviors that have been associated with student outcomes. Strong applications would include, for example, measures of instructional practices that have been shown to be effective for improving student learning in previous research.

Also appropriate for Goal Three applications are proposals to *replicate* the efficacy of an intervention in a different setting. For instance, in a previous study, the applicant could have demonstrated the efficacy of an intervention in a small random assignment trial in an urban school district, and a reasonable next step would be to *replicate* these findings in a poor rural school district.

(ii)   To propose evaluations of interventions that are already widely used in one or more states but have not been rigorously evaluated (e.g., a commercially distributed curriculum), applicants must provide documentation of the widespread use of the program to justify the proposed efficacy evaluation. In such cases, applicants do ***not*** need to provide evidence of the relation between exposure to the intervention and student outcomes. Of course, if such evidence is available, applicants should include it.

(iii)   All Goal Three applicants should address the *practical* importance of the proposed intervention. For example, is the professional development on reading for middle school teachers sufficiently comprehensive that it includes strategies for teaching reading across academic content areas and appropriate for teachers of students from Grades 6 to 8? Does the preliminary data show that the components of the curriculum are sufficiently different from existing curricula that comparison

of the proposed curriculum to an existing curriculum could potentially yield a positive effect and does the preliminary outcome data support the thesis that the proposed curriculum has the potential to improve students' test scores in educationally meaningful increments?

(iv)   Applicants should clearly describe the components of the intervention and how they relate to each other both temporally (or operationally) and theoretically (e.g., why does A lead to B). When applicants clearly describe the model that guides the intervention and the specific components making up the intervention, reviewers are better able to evaluate the relation between the theoretical and empirical foundation for the intervention and the intervention (e.g., is the proposed intervention a reasonable operationalization of the theory?). Reviewers are also better able to evaluate the relation between the intervention and the outcome measures (e.g., do the proposed measures tap the constructs that the intervention is intended to address?). Strong applications will also include detailed descriptions of what the comparison group experiences. By clearly describing the components of the intervention and the comparable treatment (e.g., curriculum, instructional approach, professional development) that the comparison group will receive, reviewers are better able to judge whether (a) the intervention is sufficiently different from the comparison treatment so that one might reasonably expect a difference in student outcomes, and (b) fidelity measures and observations of the comparison group are sufficiently comprehensive and sensitive to identify and document critical differences between what the intervention and comparison groups receive.

By addressing the theoretical and empirical support for the proposed intervention and the practical importance of the intervention, and by clearly describing the components of the intervention, Goal Three applicants are addressing aspects of the significance of their proposal.

Applicants deciding whether their proposal is more appropriate for Goal Two or Goal Three or Goal Four may find the decision tree to be useful.

c. *Methodological requirements*. Under Goal Three, the proposed research design must be appropriate for answering the research questions or hypotheses that are posed.

(i)   *Sample*. The applicant should define, as completely as possible, the sample to be selected and sampling procedures to be employed for the proposed study. Additionally, the applicant should describe strategies to insure that participants will remain in the study over the course of the evaluation.

(ii)   *Design*. The applicant must provide a detailed research design. Applicants should describe how potential threats to internal and external validity will be addressed. Studies using randomized assignment to treatment and comparison conditions are strongly preferred. When a randomized trial is used, the applicant should clearly state the unit of randomization (e.g., students, classroom, teacher, or school). Choice of randomizing unit or units should be grounded in a theoretical framework. Applicants should explain the procedures for assignment of groups (e.g., schools, classrooms) or participants to treatment and comparison conditions.

        Only in circumstances in which a randomized trial is not possible may alternatives that substantially minimize selection bias or allow it to be modeled be employed. Applicants

proposing to use a design other than a randomized design must make a compelling case that randomization is not possible. Acceptable alternatives include appropriately structured regression-discontinuity designs or other well-designed quasi-experimental designs that come close to true experiments in minimizing the effects of selection bias on estimates of effect size. A well-designed quasi-experiment is one that reduces substantially the potential influence of selection bias on membership in the intervention or comparison group. This involves demonstrating equivalence between the intervention and comparison groups at program entry on the variables that are to be measured as program outcomes (e.g., reading achievement test scores), or obtaining such equivalence through statistical procedures such as propensity score balancing or regression. It also involves demonstrating equivalence or removing statistically the effects of other variables on which the groups may differ and that may affect intended outcomes of the program being evaluated (e.g., demographic variables, experience and level of training of teachers, motivation of parents or students). Finally, it involves a design for the initial selection of the intervention and comparison groups that minimizes selection bias or allows it to be modeled. For example, a very weak quasi-experimental design that would *not* be acceptable as evidence of program efficacy would populate the intervention condition with students who volunteered for the program to be evaluated, and would select comparison students who had the opportunity to volunteer but did not. In contrast, an acceptable design would select students in one particular geographical area of a city to be in the intervention; whereas students in another geographical area, known to be demographically similar, would be selected to be in the comparison condition. In the former case, self-selection into the intervention is very likely to reflect motivation and other factors that will affect outcomes of interest and that will be impossible to equate across the two groups. In the latter case, the geographical differences between the participants in the two groups would ideally be unrelated to outcomes of interest, and in any case, could be measured and controlled for statistically.

(iii)   *Power*. Applicants should clearly address the power of the evaluation design to detect a reasonably expected and minimally important effect. When applicants justify what constitutes a reasonably expected effect, applicants should indicate clearly (e.g., including the statistical formula) how the effect size was calculated.

Many evaluations of education interventions are designed so that clusters or groups of students, rather than individual students, are randomly assigned to treatment and comparison conditions. In such cases, the power of the design depends in part on the degree to which the observations of individuals within groups are correlated with each other on the outcomes of interest. For determining the sample size, applicants need to consider the number of clusters, the number of individuals within clusters, the potential adjustment from covariates, the desired effect, the intraclass correlation (i.e., the variance between clusters relative to the total variance between and within clusters), and the desired power of the design (note, other factors may also affect the determination of sample size, such as using one-tailed vs two-tailed tests, repeated observations, attrition of participants, etc.; see Donner & Klar, 2000; Murray, 1998; W.T. Grant Foundation & University of Michigan, http://sitemaker.umich.edu/group-based/optimal_design_software). Strong applications will include empirical justification for the intraclass correlation and anticipated effect size used in the power analysis. When calculating the power of the design, applicants should anticipate the degree to which the magnitude of the expected effect may vary

across the primary outcomes of interest (e.g., across a set of language, vocabulary, and reading measures, one might anticipate larger effects on some measures relative to other measures).

(iv)   *Measures*. Investigators should include relevant standardized measures of student achievement (e.g., standardized measures of mathematics achievement or reading achievement) in addition to other measures of student learning and achievement (e.g., researcher-developed measures). For Teacher Quality and Education Leadership applications, applicants must also include measures of teacher/leader practices. The Institute recognizes that applicants under Teacher Quality and Education Leadership who are proposing to develop and assess interventions that are administered as part of *preservice* training for future teachers or education leaders may not have sufficient time within the constraints of the award period to follow the preservice teachers and leaders into their first positions and obtain data on their students. In such instances, applicants should include measures of teacher/education leader behaviors that have been associated with student outcomes and provide sufficient justification to assert that demonstrating change on these proximal measures is likely to be associated with change in student outcomes.

The applicant should provide information on the reliability, validity, and appropriateness of proposed measures. In strong applications, investigators will make clear that the skills or content the intervention is designed to address are captured in the various measures that are proposed.

(v)   *Fidelity of implementation of the intervention*. Researchers should attend to questions of implementation and how best to train and support teachers in the use of these interventions. The applicant should specify how the implementation of the intervention will be documented and measured. In strong applications, investigators will make clear how the fidelity measures capture the critical features of the intervention. The proposal should either indicate how the intervention will be maintained consistently across multiple groups (e.g., classrooms and schools) over time or describe the parameters under which variations in the implementation may occur. Investigators should propose research designs that permit the identification and assessment of factors impacting the fidelity of implementation.

(vi)   *Comparison group, where applicable*. Comparisons of interventions against other conditions are only meaningful to the extent that one can tell what students in the comparison settings receive or experience. Applicants should include procedures for describing practices in the comparison groups. Applicants should be able to compare intervention and comparison groups on the implementation of critical features of the intervention so that, for example, if there is no observed difference in student performance between intervention and comparison students, they can determine if key elements of the intervention were also practiced and implemented in the comparison groups.

In evaluations of education interventions, students in the comparison group typically receive some kind of treatment; rarely is the comparison group a "no-treatment" control. Students in the comparison group are still in school experiencing the school's curriculum and instruction. For some evaluations, the primary question is whether the treatment is more effective than a particular alternative treatment. In such instances, the comparison group receives a well-defined treatment that is usually an important comparison to the target intervention for theoretical or pragmatic reasons. In other cases, the primary question is whether the treatment is more

effective than what is generally available and utilized in schools. In such cases, the comparison group might receive what is sometimes called "business-as-usual." That is, the comparison group receives whatever the school or district is currently using or doing in a particular area. Business-as-usual generally refers to situations in which the standard or frequent practice across the nation is a relatively undefined education treatment. However, business-as-usual may also refer to situations in which a branded intervention (e.g., a published curriculum) is implemented with no more support from the developers of the program than would be available under normal conditions. In either case, *using a business-as-usual comparison group is acceptable.* When business-as-usual is one or another branded intervention, applicants should specify the treatment or treatments received in the comparison group. In all cases, applicants should account for the ways in which what happens in the comparison group are important to understanding the net impact of the experimental treatment. As noted in the preceding paragraph, in strong applications, investigators should propose strategies and measures for comparing the intervention and comparison groups on key features of the intervention.

The purpose here is to obtain information useful for *post hoc* explanations of why the experimental treatment does or does not improve student learning relative to the counterfactual.

Finally, the applicant should describe strategies they intend to use to avoid contamination between treatment and comparison groups.

(vii)   *Mediating and moderating variables.* Observational, survey, or qualitative methodologies are encouraged as a complement to experimental methodologies to assist in the identification of factors that may explain the effectiveness or ineffectiveness of the intervention. Mediating and moderating variables that are measured in the intervention condition that are also likely to affect outcomes in the comparison condition should be measured in the comparison condition (e.g., student time-on-task, teacher experience/time in position).

The evaluation should be designed to account for sources of variation in outcomes across settings (i.e., to account for what might otherwise be part of the error variance). Applicants should provide a theoretical rationale to justify the inclusion (or exclusion) of factors/variables in the design of the evaluation that have been found to affect the success of education programs (e.g., teacher experience, fidelity of implementation, characteristics of the student population). The research should demonstrate the conditions and critical variables that affect the success of a given intervention. The most scalable interventions are those that can produce the desired effects across a range of education contexts.

(viii) *Cost of the intervention.* Strong applications will include a Cost-Feasibility analysis to assess the financial costs of program implementation and assist schools in understanding whether implementation of the program is practicable given their available resources. Data should be collected on the monetary expenditures for the resources, or "ingredients," that are required to implement the program. Financial costs for personnel, facilities, equipment, materials, and other relevant inputs should be included. Annual costs should be assessed to adequately reflect expenditures across the lifespan of the program. For Goal Three applications, the Institute is *not* asking applicants to conduct an economic evaluation of the program (e.g., cost-benefit, cost-utility, or cost-effectiveness analyses), although applicants may propose such evaluation

activities if desired. However, for Goal Four applications, the Institute does encourage applicants to conduct an economic evaluation. For additional information on how to calculate the costs of a program or conduct an economic evaluation, applicants might refer to Levin and McEwan (2001).

(ix) *Data analysis*. All proposals must include detailed descriptions of data analysis procedures. For quantitative data, specific statistical procedures should be described. The relation between hypotheses, measures, independent and dependent variables should be clear. For qualitative data, the specific methods used to index, summarize, and interpret data should be delineated.

Most evaluations of education interventions involve clustering of students in classes and schools and require the effects of such clustering to be accounted for in the analyses, even when individuals are randomly assigned to condition. Such circumstances generally require specialized multilevel statistical analyses using computer programs designed for such purposes. Strong applications will provide sufficient detail for reviewers to judge the appropriateness of the data analysis strategy. For random assignment studies, applicants need to be aware that typically the primary unit of analysis is the unit of random assignment.

d. *Personnel and resources*. Competitive applicants will have research teams that collectively demonstrate expertise in (a) the relevant academic content areas (e.g., reading, science, and where applicable, teacher education); (b) implementation of, and analysis of results from, the research design that will be employed; and (c) working with teachers, schools, or other education delivery settings that will be employed.

An applicant may involve curriculum developers or distributors (*including for-profit entities*) in the project, from having the curriculum developers as full partners in its proposal to using off-the-shelf curriculum materials without involvement of the developer or publisher. Involvement of the curriculum developer or distributor must not jeopardize the objectivity of the evaluation. *Collaborations including for-profit distributors of curriculum materials should justify the need for Federal assistance to undertake the evaluation of programs that are marketed to consumers and consider sharing the cost of the evaluation.*

Competitive applicants will have access to institutional resources that adequately support research activities and access to schools in which to conduct the research. Strong applications will document the availability and cooperation of the schools or other education delivery settings that will be required to carry out the research proposed in the application via a letter of support from the education organization.

e. *Awards*. Typical awards for projects at this level will be $250,000 to $750,000 (total cost = direct + indirect costs) per year for a maximum of 4 years. Larger budgets will be considered if a compelling case can be made for such support. The size of the award depends on the scope of the project.

E. Requirements for Goal Four (Effectiveness Evaluations)
a. *Purpose of effectiveness evaluations*. Through all of its research programs that include the Effectiveness Evaluations goal (Goal Four), the Institute intends to support effectiveness evaluations of interventions - programs, practices, policies - to determine whether or not fully developed interventions are effective when they are implemented under conditions that would be typical if a school district or

other education delivery setting were to implement them (i.e., without special support from the developer or the research team) across a variety of conditions (e.g., different student populations, different types of schools). The key differences between Effectiveness Evaluations (Goal Four) and Efficacy Evaluations (Goal Three), as the Institute uses these terms, have to do with the delivery of the intervention and the diversity of the sample. Effectiveness Evaluations require the intervention to be implemented at a distance from the researcher/developer of the intervention. That is, the researchers must not be heavily involved in making the intervention work. The intervention must be implemented in the school or other authentic education setting as it would be if the school, or entity, had purchased and implemented the intervention on its own without any involvement in a research study. Second, Effectiveness Evaluations require sufficient diversity in the sample of schools, classrooms, or students to ensure appropriate generalizability. The latter typically requires a larger sample than an Efficacy Evaluation. For Effectiveness Evaluations, the primary question of interest is, "Does this intervention produce a net positive increase in student learning and achievement relative to the control group?" As is true for Goal Three studies, for Goal Four studies, depending on the research question of interest, the control group may receive a well-defined alternative treatment, or may receive whatever programs and practices are already currently available and utilized by schools (business-as-usual control group). Finally, the Institute invests in Effectiveness Evaluations for interventions that have strong prior evidence of the efficacy of the intervention.

b. *Requirements for proposed intervention*. To be considered for Goal Four awards, applicants must provide a clear rationale for the *practical* importance of the intervention. Applicants should address three questions related to practical importance. (i) Is the intervention likely to produce educationally meaningful effects on outcomes that are important to educational achievement (e.g., grades, achievement test scores) and, therefore, are of interest to parents, teachers, and education decision makers? (ii) Is the intervention reasonably affordable to schools and other education delivery entities? (iii) Is the intervention designed so that it is feasible for schools and other education delivery entities to implement the intervention? In addition, applicants should clearly describe the components of the intervention. Interventions appropriate for study under Goal Four are interventions that are fully developed and have evidence of the efficacy of the program on a limited scale.

(i)   *Educationally meaningful effects*. Applicants must provide *strong* evidence of the efficacy of the program as implemented on a small scale to justify the proposal to conduct a large-scale evaluation of the effectiveness of the intervention. As an example of strong evidence of efficacy, an applicant might describe the results of two or more small scale, rigorously conducted evaluations using random assignment to intervention and comparison conditions in which the efficacy of the intervention is demonstrated with different populations of students (e.g., students from middle income families in a suburban school district and students from low income families in a poor rural school district). Alternatively, a single efficacy evaluation might have involved schools from more than one district and included a diverse population of students and alone could constitute sufficient evidence of the efficacy of the intervention. Importantly, the evidence of efficacy must be based on the results of randomized field trials, or well-designed quasi-experimental evaluations. Strong applications will include information on the size and statistical significance of the effects that were obtained through efficacy trials. Effect sizes and confidence limits should typically be calculated based on a unit of analysis that is the same as the unit of assignment. For example, the results of an efficacy trial in which classrooms were assigned to conditions should be analyzed based on classroom means rather than results from individual

students. Applicants should indicate clearly (e.g., including the statistical formula) how the effect size was calculated when they use effect sizes as part of the rationale for justifying their intervention. Furthermore, information on effect sizes is more useful to reviewers when sufficient context for interpreting the effect sizes is provided.

(ii)   *Affordable for schools*. Strong applications will provide documentation of the per-pupil or per-school cost for the intervention and provide reviewers with sufficient context for evaluating the affordability of the intervention.

(iii)   *Feasible implementation*.   The materials, training procedures, organizational arrangements, and all other aspects of the intervention must be developed to the point where the intervention is ready to be implemented under real-world circumstances in a real-world way. Strong applications will provide reviewers with sufficient information to evaluate whether implementation of the intervention is feasible for schools and other education entities under normal conditions (i.e., without any support from the researchers or developers of the intervention that would not typically be available to entities wanting to implement the intervention outside of a research study). For example, applicants might include results from prior efficacy trials indicating the level of support provided to teachers implementing the intervention and the level of fidelity attained.

(iv)   *Components of the intervention*. All applicants should clearly describe the components of the intervention. When applicants clearly describe the components of the intervention, reviewers are better able to evaluate the relation between the intervention and the outcome measures (e.g., do the proposed measures tap the constructs that the intervention is intended to address?). Strong applications will also include detailed descriptions of what the comparison group experiences. By clearly describing the components of the intervention and the comparable treatment (e.g., curriculum, instructional approach, professional development) that the comparison group will receive, reviewers are better able to judge whether (a) the intervention is sufficiently different from the comparison treatment so that one might reasonably expect a difference in student outcomes, and (b) fidelity measures and observations of the comparison group are sufficiently comprehensive and sensitive to identify and document critical differences between what the intervention and comparison groups receive.

c. *Implementation of the intervention*. One goal of effectiveness evaluations of interventions is to determine if programs are effective when the developers of the program do not provide any more support than would be available under normal conditions. That is, the program should be implemented as it would be if the schools or other entities that are delivering the program were to obtain the program on their own and decide to use it apart from participation in any research and evaluation study. A second goal is to determine if programs implemented under these conditions are effective in a variety of settings. Interventions that are effective at scale are those that can produce the desired effects across a range of education contexts. For Goal Four, the applicant should detail the conditions under which the intervention will be implemented – including explicitly detailing what involvement the researcher/developer will have in the implementation of the intervention and justifying this level of involvement – and provide procedures that will capture the conditions and critical variables that affect the success of a given intervention.

By addressing the implementation of the intervention and the requirements for the intervention in section 5.E.b, Goal Four applicants are addressing the significance of their proposal.

Applicants deciding whether their proposal is more appropriate for Goal Two or Goal Three or Goal Four may find the decision tree to be useful.

d. *Methodological requirements*. **Under Goal Four, the proposed research design must be appropriate for answering the research questions or hypotheses that are posed.** For the methodological requirements for Goal Four projects, please refer to the methodological requirements listed under Goal Three.

e. *Personnel and resources*. Competitive applicants will have research teams that collectively demonstrate expertise in (a) the relevant academic content areas (e.g., reading, science, and where applicable, teacher education); (b) implementation of, and analysis of results from, the research design that will be employed; and (c) working with teachers, schools, or other education delivery settings that will be employed.

Competitive applicants will have access to institutional resources that adequately support research activities and access to schools in which to conduct the research. Strong applications will document the availability and cooperation of the schools or other education delivery settings that will be required to carry out the research proposed in the application via a letter of support from the education organization.

An applicant may involve developers or distributors (*including for-profit entities*) of the intervention in the project, from having the developers as full partners in its proposal to using off-the-shelf curriculum materials without involvement of the developer or publisher. However, involvement of the curriculum developer or distributor must not jeopardize the objectivity of the evaluation. Strong applications will carefully describe the role, if any, of the developer/distributor of the intervention. Developers may not provide any training or support for the implementation that is not normally available to users of the intervention. Strong applications will describe how objectivity in the evaluation will be maintained; for example, if the applicant is the developer of the intervention, the applicant might propose to have data collection and data analyses conducted by individuals who are *not* part of the organization that developed or distributes the intervention.

Collaborations including for-profit distributors of curriculum materials should justify the need for Federal assistance to undertake the evaluation of programs that are marketed to consumers and consider sharing the cost of the evaluation.

f. *Awards*. The scope of Goal Four projects may vary. A smaller project might involve several schools within a large urban school district in which student populations vary in terms of SES, race, and ethnicity. A larger project might involve large numbers of students in several school districts in different geographical areas.

Awards for Goal Four projects may go up to a limit of $6,000,000 (total cost = direct + indirect costs) over a 5 year period. Typical awards are less. Awards depend in part on the number of sites, cost of data collection, and cost of implementation. The size of the award depends on the scope of the project.

F. Applications under Goal Five (Measurement)

Across the Institute's research programs, the Measurement goals differ in purpose. For topics that include Goal Five, the Goal Five requirements, including methodological requirements, requirements for personnel and resources, and information about awards, are described in sections on specific requirements for each topic.

a. Read/Write Goal Five
b. Math/Science Goal Five
c. Teacher Quality Read/Write Goal Five
d. Teacher Quality Math/Science Goal Five
e. Education Policy, Finance, and Systems Goal Five
f. Interventions for Struggling Adolescent and Adult Readers Goal Five
g. Cognition and Student Learning Goal Five
h. High School Reform Goal Five
i. Postsecondary Education Goal Five

PART V GENERAL SUBMISSION AND REVIEW INFORMATION

6. APPLICATIONS AVAILABLE

Application forms and instructions for the electronic submission of applications will be available for the programs of research listed in this RFA from the following web site:

https://ies.constellagroup.com

by the following dates:

Topics with July 27, 2006 Transmittal Deadline	June 15, 2006
Topics with November 16, 2006 Transmittal Deadline	October 5, 2006

The application form approved for use in the competitions specified in this RFA is the new, government-wide SF424 Research and Related (R&R) Form (OMB Number 4040-0001).

7. MECHANISM OF SUPPORT

The Institute intends to award grants pursuant to this request for applications. The maximum length of the award period varies by topic and within topic by goal. The maximum award length for each goal within a specific topic is specified in the award section for that topic and goal and ranges from two to five years. Please see details for each topic and goal in the Requirements of the Proposed Research section of the announcement.

8. FUNDING AVAILABLE

The size of the award depends on the scope of the project. Please see specific details in the Requirements of the Proposed Research section of the announcement. Although the plans of the Institute include the research programs (topics) described in this announcement, awards pursuant to this request for applications are contingent upon the availability of funds and the receipt of a sufficient number of meritorious applications. The number of projects funded under a specific topic and goal depends upon the number of high quality applications submitted to that topic and goal. The Institute does not have plans to award a specific number of grants under each particular topic and goal.

9. ELIGIBLE APPLICANTS

For the research grant topics, applicants that have the ability and capacity to conduct scientifically valid research are eligible to apply. Eligible applicants include, but are not limited to, non-profit and for-profit organizations and public and private agencies and institutions, such as colleges and universities.

For the Postdoctoral Research Training program, eligible applicants are academic institutions in the United States and its territories that grant doctoral degrees in fields relevant to education. The proposed Training Director must be the Principal or Co-Principal Investigator on one or more education research grants currently supported by the Institute or other funding source.

10. SPECIAL REQUIREMENTS

A. Special Requirements for the Research Topics (excludes Postdoctoral Research Training program)
Research supported through this program must be relevant to U.S. schools.

Recipients of awards are expected to publish or otherwise make publicly available the results of the work supported through this program. The Institute asks IES-funded investigators to submit voluntarily to the Educational Resources Information Center (ERIC) an electronic version of the author's final manuscript upon acceptance for publication in a peer-reviewed journal, resulting from research supported in whole or in part, with direct costs from the Institute. The author's final manuscript is defined as the final version accepted for journal publication, and includes all modifications from the peer review process. Details of the Institute's policy are posted on the Institute's website at http://ies.ed.gov.

Applicants should budget for one meeting each year in Washington, DC, with other grantees and Institute staff. At least one project representative should attend the two-day meeting.

The Institute anticipates that the majority of the research funded under this announcement will be conducted in field settings. Hence, the applicant is reminded to apply its negotiated off-campus indirect cost rate, as directed by the terms of the applicant's negotiated agreement.

Research applicants may collaborate with, or be, for-profit entities that develop, distribute, or otherwise market products or services that can be used as interventions or components of interventions in the proposed research activities. Involvement of the developer or distributor must not jeopardize the objectivity of the evaluation. Applications from, or collaborations including, such organizations should justify the need for Federal assistance to undertake the evaluation of programs that are marketed to consumers and consider sharing the cost of the evaluation, as well as sharing all or a substantial portion of the cost of the implementation of the product being evaluated (e.g., sharing the cost of textbooks for students).

B. Postdoctoral Research Training Program
Training Directors will be asked to submit a yearly report due one month prior to the annual meeting assessing the effectiveness of the fellowship and describing the status of fellows, including presentation, publication and grant proposal submissions.

Grant recipients who have not successfully recruited the number of fellows for whom they requested funding will have their continuation funding adjusted as a result.

Research associated with this training fellowship must be relevant to U.S. education. Fellowship recipients are expected to publish or otherwise make publicly available the results of the work supported through this training fellowship.

Postdoctoral fellowship recipients and Training Directors must attend one two-day meeting each year in Washington, DC, with other grantees and Institute staff.

11. LETTER OF INTENT

A letter indicating a potential applicant's intent to submit an application is optional, but encouraged, for each application. The letter of intent must be submitted electronically by the date listed at the beginning of this document, using the instructions provided at the following web site:

https://ies.constellagroup.com/

The letter of intent should include a descriptive title, the topic and goal which the application will address, and brief description of the research project (about 3,500 characters including spaces, which is approximately one page, single-spaced); the name, institutional affiliation, address, telephone number and e-mail address of the principal investigator(s); and the name and institutional affiliation of any key collaborators. The letter of intent should indicate the duration of the proposed project and provide an estimated budget request by year, and a total budget request. Although the letter of intent is optional, is not binding, and does not enter into the review of subsequent applications, the information that it contains allows Institute staff to estimate the potential workload to plan the review.

12. SUBMITTING AN APPLICATION

Applications must be submitted **electronically by 8:00 p.m**. **Eastern time** by the application transmittal deadline, using the standard forms and the instructions provided at the following web site:
https://ies.constellagroup.com

Potential applicants should check this site for information about the electronic submission procedures that must be followed and the software that will be required.

13. CONTENTS OF APPLICATION

All applications and proposals for Institute funding must be self-contained within specified page limitations. Internet Web site addresses (URLs) may not be used to provide information necessary to the review because reviewers are under no obligation to view the Internet sites.

All of the instructions and requirements regarding (a) submission of the application, (b) acceptable format of the application, (c) page limitations, and (d) required forms will be provided on the application submission website (https://ies.constellagroup.com).

In this section, the Institute provides instructions regarding the content of the (a) project summary/abstract, (b) project narrative, (c) bibliography and references cited, (d) biographical sketches of key project personnel, (e) narrative budget justification, (f) subaward budgets, (g) Appendix A, (h) Appendix B, and (i) additional forms.

A. Project Summary/Abstract
For research project applications and Postdoctoral Research Training applications, the project summary/abstract will be submitted as a .PDF attachment, is limited to 1 single-spaced page and must adhere to the margin, format, and font size requirements described in the project narrative section.

For research applications, the project summary/abstract should include: (1) the title of the project; (2) the RFA topic and goal under which the applicant is applying (e.g., development, efficacy); and brief descriptions of (3) the purpose (e.g., to develop and obtain preliminary (pilot) data on the association between exposure to a reading comprehension intervention for struggling high school readers and subsequent reading outcomes); (4) the setting in which the research will be conducted (e.g., rural high schools in Alabama); (5) the population(s) from which the participants of the study(ies) will be sampled (age groups, race/ethnicity, SES, the sampling scheme (e.g., simple random, systematic, purposive, clustered, multi-stage)); (6) if applicable, the intervention or assessment to be developed or evaluated or validated; (7) if applicable, the control or comparison condition (e.g., what will participants in the control condition experience); (8) the primary research method (e.g., experimental (including how and at what level randomization will be applied), quasi-experimental, single-subject, correlational, observational, descriptive); (9) measures of key outcomes; and (10) data analytic strategy.

For Postdoctoral Research Training applications, the project summary/abstract should include: (1) The title of the research training fellowship; (2) name and institutional affiliation of the Training Director; (3) number of fellows to be recruited and length of fellowship; (4) brief description of education research currently conducted by the proposed Training Director and opportunities for fellows to be involved in education research; and (5) brief description of the proposed training fellowship, highlighting its key research and educational features.

B. Project Narrative
The project narrative will be submitted as a .PDF attachment. Incorporating the requirements outlined under the section on Requirements of the Proposed Research, the *project research or training narrative* provides the majority of the information on which reviewers will evaluate the proposal.

Applicants to all topics *except* the Postdoctoral Research Training topic should follow the instructions provided below in section 12.B.a, Research Narrative for applications to all research topics. Applicants to the Postdoctoral Research Training topic should follow the instructions provided in section 12.B.b. Training Narrative for applications to the Postdoctoral Research Training topic.

a. Research Narrative for applications to all research topics (i.e., excluding the Postdoctoral Research Training topic). The project research narrative must include the four sections described below (i. "Significance" through iv. "Resources") in the order listed and must conform to the format requirements described on the application submission website.

The research narrative is limited to **25 single-spaced pages** for all applicants. This 25-page limit does not include any of the SF 424 forms, the one-page summary/abstract, the appendices, research on human subjects information, bibliography and references cited, biographical sketches of senior/key personnel, narrative budget justification, sub award budget information or certifications and assurances. **Reviewers are able to conduct the highest quality review when applications are concise and easy to read, with pages numbered consecutively**.

For the purposes of applications submitted under this RFA, a "page" is 8.5 in. x 11 in., on one side only, with 1 inch margins at the top, bottom, and both sides. Text must be single spaced in the narrative. To ensure that the text is easy for reviewers to read and that all applicants have the same amount of available space in which to describe their projects, applicants must adhere to the type size and format

specifications for the entire narrative including footnotes. **It is very important that applicants review carefully the "Application Format Requirements" outlined in *Fiscal Year 2007 Application Package Highlights*.**

(i)   *Significance.* In the General Requirements of the Proposed Research section and in the subsections describing the requirements for the proposed intervention for Goal Two, Goal Three, and Goal Four, the Institute details the information that the applicant should include in order to address the significance of the proposed project. For Goal One applications, that information is provided in the Goal One subsection of the General Requirements of the Proposed Research that is entitled, *Purpose of identification studies*. For Goal Five applications, that information is provided in sections 3 and 4 under the description of the purpose of Goal Five projects for each topic that includes Goal Five.

For projects in which an intervention or assessment is proposed (whether to be developed or to be evaluated) may use Appendix B to include up to 10 pages of examples of materials to be used by participants (e.g., curriculum materials for students, professional development materials for teachers or education leaders, computer screens depicting how information is presented to students, examples of test items for a proposed assessment). Applicants should be aware that all narrative text describing the theoretical background, empirical support, components of the assessment or intervention, or any other aspect of the proposal must be included within the 25-page project narrative. The only materials that are allowed in Appendix B are examples of the materials that are used by or presented to participants in the intervention or assessment.

(ii)   *Methods.* The Methods section of the application should address all of the requirements detailed in the methodological requirements sections for Goal One, Goal Two, Goal Three, Goal Four, and Goal Five.   For Goal Five applications, that information is provided in Sections 3 and 4 under the description of the methodological requirements of Goal Five projects for each topic that includes Goal Five.

(1)   Include clear, concise hypotheses or research questions;

(2)   Present a clear description of, and a rationale for, the sampling design and procedures, and the sample or study participants, including justification for exclusion and inclusion criteria and, where groups or conditions are involved, strategies for assigning participants to groups;

(3)   Provide clear descriptions of, and rationales for, data collection procedures;

(4)   Provide clear descriptions of and justification for measures to be used, including information on the reliability and validity of measures; and

(5)   Present a detailed data analysis plan that justifies and explains the selected analysis strategy, shows clearly how the measures and analyses relate to the hypotheses or research questions and the study design, and indicates how the results will be interpreted. Quantitative studies should, where sufficient information is available, include an

appropriate power analysis with sufficient detail and context for reviewers to understand the assumptions on which the power analysis was based.

(iii)   *Personnel.* Include brief descriptions of the qualifications of key personnel (information on personnel should also be provided in their curriculum vitae). For each of the key personnel, please describe the roles, responsibilities, and percent of time devoted to the project.

(iv)   *Resources*. Provide a description of the resources available to support the project at the applicant's institution and in the field settings in which the research will be conducted.

b.   *Training Narrative for applications to the Postdoctoral Research Training topic.* Incorporating the requirements outlined under Specific requirements for applications submitted to the Postdoctoral Training topic, the *training fellowship narrative* provides the majority of the information on which reviewers will evaluate the proposal and should include the following sections (i through iii) in the order listed below.

The postdoctoral training narrative is limited to 15 single-spaced pages. This 15-page limit does not include any of the SF 424 forms, the one-page summary/abstract, the appendices, research on human subjects information, bibliography and references cited, biographical sketches of senior/key personnel, narrative budget justification, sub award budget information or certifications and assurances. **Reviewers are able to conduct the highest quality review when applications are concise and easy to read, with pages numbered consecutively**.

For the purposes of applications submitted under this RFA, a "page" is 8.5 in. x 11 in., on one side only, with 1 inch margins at the top, bottom, and both sides. Text must be single spaced in the narrative. To ensure that the text is easy for reviewers to read and that all applicants have the same amount of available space in which to describe their projects, applicants must adhere to the type size and format specifications for the entire narrative including footnotes. **It is very important that applicants review carefully the "Application Format Requirements" outlined in *Fiscal Year 2007 Application Package Highlights*.**

(i)   *Detailed Description of the Proposed Training Fellowship (suggested 8-10 pages).* Applicants must discuss how the proposed training fellowship will address the issues raised in this request for applications (e.g., describe ongoing lines of education research being conducted by the proposed Training Director and how fellows will play an active role in these research activities). Applicants should describe the overall goals and anticipated impact of the proposed research training fellowship. Applicants should discuss potential career development opportunities to be provided to fellowship recipients. Applicants should list concrete strategies for advertising the training fellowship and recruiting fellows and the approximate number of fellows to be admitted to the training fellowship. Applicants should address how recruitment procedures will encourage the participation of underrepresented minorities and persons with disabilities.

(ii)   *Personnel (suggested 2-3 pages).* Applicants should describe the qualifications of key personnel, including the Training Director, specifying their proposed role in the training fellowship (information on personnel should also be provided in their curriculum vitae).

Applicants should include information on previous postdoctoral fellows who have been trained and/or supported by the Training Director and other faculty who will be mentoring the potential postdoctoral fellows (e.g., number of postdoctoral fellows in past 5 years, average length of the fellowship, current positions of previous fellows). Information on previous postdoctoral fellows may be listed in tabular format in Appendix A.

If specific individuals have been identified to whom fellowships would be offered their curriculum vitae should be included in the application.

(iii)   *Resources (suggested 1-2 pages).*   Applicants should provide a description of the resources available to support the training fellowship at the participating institution, including field settings (e.g., schools, software development labs) with which the Training Director has a relationship that could support fellows' research projects.

C. Bibliography and References Cited
This section will be submitted as a .PDF attachment. Please include complete citations, including titles and all authors, for literature cited in the research narrative.

D. Biographical Sketches of Senior/Key Personnel
This section will be submitted as a .PDF attachment. Abbreviated curriculum vitae should be provided for the principal investigator(s) and other key personnel. *Each vita is limited to 4 pages and should include information sufficient to demonstrate that personnel possess training and expertise commensurate with their duties (e.g., publications, grants, relevant research experience) and have adequate time devoted to the project to carry out their duties (e.g., list current and pending grants with the proportion of the individual's time allocated to each project).* The curriculum vita must adhere to the margin, format, and font size requirements described in the project narrative section.

E. Narrative Budget Justification
This section will be submitted as a .PDF attachment and should provide sufficient detail to allow reviewers to judge whether reasonable costs have been attributed to the project. The budget justification should correspond to the itemized breakdown of project costs that is provided in the Research & Related Budget (SF 424) Sections A & B; C, D, &E; and F-K. It should include the time commitments and brief descriptions of the responsibilities of key personnel. For consultants, the narrative should include the number of days of anticipated consultation, the expected rate of compensation, travel, per diem, and other related costs. A justification for equipment purchase, supplies, travel and other related project costs should also be provided in the budget narrative for each project year outlined in the Research & Related Budget (SF 424).

For those applications that include a subaward(s) for work conducted at collaborating institutions, the narrative should also provide the details about the subaward(s). Include the actual subaward budgets as a separate attachment. (See below "Subaward Budget".)

Applicants should use their institution's federal indirect cost rate and use the off-campus indirect cost rate where appropriate (see instructions under Section 9 Special Requirements). If less than 75 percent of total indirect costs are based on application of the off-campus rate, the applicant should provide a detailed justification.

F. Subaward Budget
This section will be submitted as a .PDF attachment. For applications that include a subaward(s) for work conducted at collaborating institutions, applicants must submit an itemized budget spreadsheet for each subaward for each project year. As noted above, the details of the subaward costs should be included in the Narrative Budget Justification. An Excel spreadsheet will be provided in the electronic application package to allow applicants to enter the subaward budget information in accordance with the prescribed format. Applicants will complete the spreadsheet in Excel format, convert it to a .PDF file, and then upload it as an attachment.

G. Appendix A
Appendix A should be included at the end of the Project Narrative, and will be submitted as part of the same .PDF attachment.

The purpose of A*ppendix A* is to allow the applicant to include any figures, charts, or tables that supplement the research text, examples of measures to be used in the project, and letters of agreement from partners (e.g., schools) and consultants. In addition, in the case of a resubmission, the applicant may use **up to 3 pages** of the appendix to describe the ways in which the revised proposal is responsive to prior reviewer feedback. These are the only materials that may be included in Appendix A; all other materials will be removed prior to review of the application. Narrative text related to any aspect of the project (e.g., descriptions of the proposed sample, the design of the study, or previous research conducted by the applicant) must be included in the research or postdoctoral training narrative. Letters of agreement should include enough information to make it clear that the author of the letter understands the nature of the commitment of time, space, and resources to the research project that will be required if the application is funded. The appendix is limited to 15 pages. The Institute recognizes that some applicants may have more letters of agreement than will be accommodated by the 15-page limit. In such instances, applicants should include the most important letters of agreement and may list the letters of agreement that are not included in the application due to page limitations.

H. Appendix B (optional)
If applicable, Appendix B should be included at the end of the Project Narrative, following Appendix A, and will be submitted as part of the same .PDF attachment.

Appendix B applies to applications under all topics, except the Postdoctoral Research Training topic. The purpose of Appendix B is to allow applicants who are proposing an intervention or assessment to include examples of curriculum material, computer screens, test items, or other materials used in the intervention or assessment. These are the only materials that may be included in Appendix B; all other materials will be removed prior to review of the application. Appendix B is limited to 10 pages. Narrative text related to the intervention (e.g., descriptions of research that supports the use of the intervention/assessment, the theoretical rationale for the intervention/assessment, or details regarding the implementation or use of the intervention/assessment) must be included in the 25-page research narrative.

I.   Additional Forms
Please note that applicants selected for funding will be required to submit the following certifications and assurances before a grant is issued:

(1) SF 424B-Assurances-Non-Construction Programs
(2) ED-80-0013-Certification Regarding Lobbying, Debarment, Suspension and other
      Responsibility Matters; and Drug-Free Workplace Requirements
(3) ED 80-0014 (if applicable)-Lower Tier Certification
(4) SF-LLL (if applicable) - Disclosure of Lobbying Activities
(5) Protection of Human Research Subjects assurance and/or Institutional Review Board
      certification, as appropriate

14. APPLICATION PROCESSING

Applications must be received by **8:00 p.m. Eastern time** on the application transmittal deadline listed
in the heading of this request for applications. Upon receipt, each application will be reviewed for
compliance and for responsiveness to this request for applications. Applications that do not address
specific requirements of this request will be returned to the applicants without further consideration.

15. PEER REVIEW PROCESS

Applications that are compliant and responsive to this request will be evaluated for scientific and
technical merit. Reviews will be conducted in accordance with the review criteria stated below by a
panel of scientists who have substantive and methodological expertise appropriate to the program of
research and request for applications.

Each application will be assigned to one of the Institute's scientific review panels. At least two primary
reviewers will complete written evaluations of the application, identifying strengths and weaknesses
related to each of the review criteria. Primary reviewers will independently assign a score for each
criterion, as well as an overall score, for each application they review. Based on the overall scores
assigned by primary reviewers, an average overall score for each application will be calculated and a
preliminary rank order of applications prepared before the full peer review panel convenes to complete
the review of applications.

The full panel will consider and score only those applications deemed to be the most competitive and to
have the highest merit, as reflected by the preliminary rank order. A panel member may nominate for
consideration by the full panel any proposal that he or she believes merits full panel review but would
not have been included in the full panel meeting based on its preliminary rank order.

16. REVIEW CRITERIA FOR SCIENTIFIC MERIT

A. All Research Topics (excludes Postdoctoral Research Training Fellowships)
The goal of Institute-supported research is to contribute to the solution of education problems and to
provide reliable information about the education practices that support learning and improve academic
achievement and access to education for all students. Reviewers for all applications, except for those
submitted under the Postdoctoral Research Training topic, will be expected to assess the following
aspects of an application in order to judge the likelihood that the proposed research will have a
substantial impact on the pursuit of that goal. Information pertinent to each of these criteria is also

described above in the section on Requirements of the Proposed Research and in the description of the project narrative, which appears in the section on Contents of Application.

a. *Significance*. Does the applicant present a compelling rationale for the proposed project? Are there strong theoretical reasons, empirical support, and practical reasons to justify the development and/or evaluation of the proposed intervention or assessment? Does the applicant make a compelling case for the potential contribution of the project to the solution of an education problem? Does the applicant clearly describe the components of the intervention or assessment and the relations among the components? For cases in which the applicant proposes to develop or evaluate an intervention, does the applicant present a strong rationale justifying the need to evaluate the selected intervention (e.g., does prior evidence suggest that the intervention is likely to substantially improve student learning and achievement)?

b. *Research plan*. Does the applicant present (a) clear hypotheses or research questions; (b) clear descriptions of and strong rationales for the sample, the measures (including information on the reliability and validity of measures), data collection procedures, and research design; and (c) a detailed and well-justified data analysis plan? Does the research plan meet the requirements described in the section on the Requirements of the Proposed Research and in the description of the research narrative in the section on Contents of Application? Is the research plan appropriate for answering the research questions or testing the proposed hypotheses?

c. *Personnel*. Does the description of the personnel make it apparent that the principal investigator, project director, and other key personnel possess the training and experience and will commit sufficient time to competently implement the proposed research?

d. *Resources*. Does the applicant have the facilities, equipment, supplies, and other resources required to support the proposed activities? Do the commitments of each partner show support for the implementation and success of the project?

B. Postdoctoral Research Training Fellowships

The goal of Institute-supported programs is to contribute to the solution of education problems and to provide reliable information about the education practices that support learning and improve academic achievement and access to education for all students. Reviewers will be expected to assess the following aspects of an application in order to judge the likelihood that the proposed research training fellowship will have a substantial impact on the pursuit of that goal. Information pertinent to each of these criteria is also described above in the section on Requirements of the Proposed Training Fellowship and in the description of the training fellowship narrative (in Section G).

a. *Significance*. Does the applicant make a compelling case for the potential contribution of the proposed research training fellowship? Are the Training Director's research projects likely to advance the scholarly development of the participating fellows?

b. *Fellowship plan*. Does the applicant present (a) a strong plan for the proposed research training fellowship, including the role that fellows will play in ongoing research projects; (b) a clear orientation that emphasizes rigorous training in research methodology and statistics; and (c) an emphasis on research that addresses practical problems in education? Does the proposed plan meet the requirements

described in the section on the Requirements of the Proposed Training Fellowship and in the description of the training fellowship narrative (in Section G)?

c. *Personnel*. Does the description of the personnel make it apparent that the Training Director and other faculty possess the training and experience and will commit sufficient time to competently implement the proposed training fellowship?

d. *Resources*. Does the applicant have the facilities, equipment, supplies, and other resources required to support the proposed training activities?

17. RECEIPT AND START DATE SCHEDULE

A. Letter of Intent Receipt Dates:
Topics with July 27, 2006 Transmittal Deadline   June 1, 2006
Topics with November 16, 2006, Transmittal Deadline   September 14, 2006

B. Application Transmittal Deadlines:
Topics with July 27, 2006 Transmittal Deadline   July 27, 2006
Topics with November 16, 2006, Transmittal Deadline   November 16, 2006

C. Earliest Anticipated Start Date:
Topics with July 27, 2006 Transmittal Deadline   March 1, 2007
Topics with November 16, 2006, Transmittal Deadline   July 1, 2007

18. AWARD DECISIONS

A. All Research Topics (excludes Postdoctoral Research Training Fellowships)
The following will be considered in making award decisions:
- o   Scientific merit as determined by peer review
- o   Responsiveness to the requirements of this request
- o   Performance and use of funds under a previous Federal award
- o   Contribution to the overall program of research described in this request
- o   Availability of funds

B. Postdoctoral Research Training Fellowships
The following will be considered in making award decisions:
- o   Overall strength of the proposed training fellowship as determined by peer review
- o   Responsiveness to the requirements of this request
- o   Performance and use of funds under a previous Federal award
- o   Contribution to the overall goals described in this request
- o   Availability of funds

19. INQUIRIES MAY BE SENT TO:

A. Reading and Writing
   Dr. Elizabeth Albro
   Institute of Education Sciences
   555 New Jersey Avenue, NW
   Washington, DC 20208

   Email: Elizabeth.Albro@ed.gov
   Telephone: (202) 219-2148

B. Interventions for Struggling Adolescent and Adult Readers
   Dr. Elizabeth Albro
   Institute of Education Sciences
   555 New Jersey Avenue, NW
   Washington, DC 20208

   Email: Elizabeth.Albro@ed.gov
   Telephone: (202) 219-2148

C. Mathematics and Science Education
   Dr. Brett Miller
   Institute of Education Sciences
   555 New Jersey Avenue, NW
   Washington, DC 20208

   Email: Brett.Miller@ed.gov
   Telephone: (202) 219-2096

D. Teacher Quality (Reading and Writing and Mathematics and Science Education)
   Dr. Harold Himmelfarb
   Institute of Education Sciences
   555 New Jersey Avenue, NW
   Washington, DC 20208

   Email: Harold.Himmelfarb@ed.gov
   Telephone: (202) 219-2031

E. Education Leadership
   Dr. Katina Stapleton
   Institute of Education Sciences
   555 New Jersey Avenue, NW
   Washington, DC 20208

   Email: Katina.Stapleton@ed.gov
   Telephone: (202) 219-2154

F. Education Policy, Finance, and Systems
Dr. Katina Stapleton
Institute of Education Sciences
555 New Jersey Avenue, NW
Washington, DC 20208

Email: Katina.Stapleton@ed.gov
Telephone: (202) 219-2154

G. Postdoctoral Research Training
Dr. James Griffin
Institute of Education Sciences
555 New Jersey Avenue, NW
Suite 611a
Washington, DC 20208

Email: James.Griffin@ed.gov
Telephone: (202) 219-2280

H. Cognition and Student Learning
Dr. Brett Miller
Institute of Education Sciences
555 New Jersey Avenue, NW
Washington, DC 20208

Email: Brett.Miller@ed.gov
Telephone: (202) 219-2096

I. High School Reform
Dr. David Sweet
Institute of Education Sciences
555 New Jersey Avenue, NW
Washington, DC 20208

Email: David.Sweet@ed.gov
Telephone: (202) 219-1748

J. Postsecondary Education
Dr. Katina Stapleton
Institute of Education Sciences
555 New Jersey Avenue, NW
Washington, DC 20208

Email: Katina.Stapleton@ed.gov
Telephone: (202) 219-2154

20. PROGRAM AUTHORITY

20 U.S.C. 9501 <u>et</u> <u>seq</u>., the "Education Sciences Reform Act of 2002," Title I of Public Law 107-279, November 5, 2002. This program is not subject to the intergovernmental review requirements of Executive Order 12372.

21. APPLICABLE REGULATIONS

The Education Department General Administrative Regulations (EDGAR) in 34 CFR parts 74, 77, 80, 81, 82, 84, 85, 86 (part 86 applies only to institutions of higher education), 97, 98, and 99. In addition 34 CFR part 75 is applicable, except for the provisions in 34 CFR 75.100, 75.101(b), 75.102, 75.103, 75.105, 75.109(a), 75.200, 75.201, 75.209, 75.210, 75.211, 75.217, 75.219, 75.220, 75.221, 75.222, and 75.230.

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