Pedagogical Innovation and Research Opportunities at the National Science Foundation

CUNY Community College Collaborative Incentive Research Grant Program

Building the Foundations for Pedagogical Research: A One-Day Grant Writing Workshop

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Presentation Components

• 1. NSF DUE programs of interest – STEP, ATE, TUES, S-STEM
• 2. The review process
• 3. Mock proposal review and discussion
• 4. Components of pedagogical research
NSF DUE Mission – Promote excellence in undergraduate STEM education for all students

Each solicitation has its own objectives and criteria, many involving pedagogical research.

The success of the NSF’s effort depends on the peer review process.
The DUE web page – [www.NSF.gov](http://www.NSF.gov) - provides information about solicitation components and awards

- Programs of Special Interest
  - 1. STEP
  - 2. ATE
  - 3. TUES
  - 4. S-STEM
Components of All Solicitations

- Important information and revision notices
- Summary of program
- Introduction
- Program Description
- Award Information
- Eligibility Information
- Proposal Preparation and Submission Instructions
- Proposal Processing and Review Procedures
- Award Administration Information
- Agency Contacts
- Other Information
Matching proposal goals and activities with those of the solicitation is important for successful funding
1. **STEP: STEM Talent Expansion Program**

**Basic Goals:**

- Increase the number of students (US Citizens or permanent residents) in STEM
- Increase associate / bachelor’s degrees
  - Established or emerging STEM fields
- Community colleges get credit for transfers to 4-year STEM programs
- Type 1 - implementation at academic institutions
- Type 2 – educational research projects on associate or baccalaureate degree attainment in STEM
1. STEP: Successful projects might include:

- Bridge programs that enable additional preparation for students from HS or community colleges
- Programs to improve the quality of student learning
  - Peer tutoring, learning communities, etc.
  - new pedagogical approaches (mastery learning, active learning, etc.)
- Programs to encourage undergraduate research
- Student support mechanisms
1. STEP: Expected components:

- Description of activities
- Plan for continuing efforts to increase number of STEM students & graduates (institutionalization)
- Formative assessment of progress towards goals
- Dissemination of project results to broader community
- Data Management Plan
- Post Doctoral Researcher Mentoring Plan
2. ATE: Advanced Technological Education

**Synopsis:** Focus on two-year colleges. Emphasis on the education of technicians for the high-technology fields that drive the nation’s economy.

- Partnerships between academic institutions and employers to promote improved technician education.
- Supports curriculum development, college faculty and secondary school teacher professional development, career pathways from secondary schools to two-year colleges and to four-year institutions.
- Articulation agreements
- Educational research to advance knowledge related to technician education
- Small Grants for Institutions New to the ATE Program
2. ATE: Program Tracks: Projects, Centers, Targeted Research in Technician Education

- **ATE Projects: Program Development and Improvement**
  - Adapting educational materials
  - Developing innovative methods of laboratory and field experiences
  - Integrating industry standards
  - Improving retention and recruitment, etc.
- **ATE Centers: National, Regional, or Resource**
- **ATE Targeted Research**
3. TUES – Transforming Undergraduate Education in STEM - must focus on one or more of the following project components.

- Creating Learning Materials and Strategies
- Implementing New Instructional Strategies
- Developing Faculty Expertise
- Assessing and Evaluating Student Achievement
- Conducting Research on Undergraduate STEM Education
3. TUES Important Project Features

- Quality, Relevance and Impact
- Student Focus
- Use of and Contribution to Knowledge about STEM Education
- STEM Education Community Building
- Sustainability
- Expected Measurable Outcomes
- Project Evaluations

- **Goal:** Provides funds to institutions to provide scholarships to academically talented, but financially needy, students

- **Students** can be pursuing associate, bachelor’s, or graduate degrees

- **Scholarships** can be up to $10,000/yr - up to 4 yrs within the limits of students official level of need. (They can be less than $10K and less than 4 yrs)
S-STEM: Major features:

- Most STEM disciplines are eligible - except Social & Behavioral sciences
- Grant size: max $600,000 (up to 5% of the scholarship request can be spent for administrative costs and up to 10% for student support services)
- One proposal per constituent school or college that awards STEM degrees (e.g., School of Engineering, College of Arts & Sciences)
- Estimated $50 to $70 million available in FY 2011
4. S-STEM: Special program features

- PI must be member of STEM faculty
- Scholarships to “natural” cohorts of students
- S-STEM students are full-time & are US Citizens, Residents, Nationals, or refugees
- Institution must provide student support structures and is responsible for selecting scholarship recipients, reporting demographic information about the recipients, and managing the project
- Optional enhancements: research opportunities, tutoring, internships, etc.
- Proposals must now contain a data management plan and postdoctoral researcher mentoring plan, if applicable.
The Review Process

*Intellectual Merit and Broader Impacts*
Requirements for all Proposals
Must be addressed in project summary

**Intellectual Merit**

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

Broader Impact

• How well does the activity advance discovery and understanding while promoting teaching, training, and learning?
• How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)?
• To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships?
• Will the results be disseminated broadly to enhance scientific and technological understanding?
• What may be the benefits of the proposed activity to society?
• Examples illustrating activities likely to demonstrate broader impacts are available electronically on the NSF website
Features of Competitive Proposals

- Original ideas. Potentially high impact.
- Succinct, focused project plan. Sufficient detail provided.
- Realistic amount of work – timeline and responsibility delineated.
- Cost effective – budget aligned with activities.
- Demonstrated knowledge of field (literature survey) and experience of PIs. Project builds on prior knowledge.
- Rationale and evidence of potential effectiveness.
- Likelihood the project will be sustained.
- Solid evaluation plan including formative and summative assessment.
Mock Panel Review

- Understanding the review process should help you to prepare better proposals.
Components of Educational Research

- More than evaluation, which assesses the quality and impact of project activities. Monitoring is the most basic evaluation.
  - Identifiable research question with measureable variables
  - Interventions selected using a theory of action on how the interventions are expected to achieve goals.
  - Instruments to measure key factors reliably and an understanding of the instrument’s limitations. If comparing groups they should initially be similar.
  - Analysis which provides a systematic and reliable picture, acknowledging alternate explanations and why they were ruled out.
Thank you for your attention

For more information:

- Vet ideas with a program officer
- Volunteer to review proposals.

Opinions expressed in this presentation are those of the presenter and are not official NSF policy
Summary

- NSF DUE programs with pedagogical research components – STEP, ATE, TUES. Scholarships through S-STEM
- Review of proposals is based on intellectual merit and broader impacts
- Understanding the review process will help you prepare better proposals
- Educational research involves developing a hypothesis and testing it by collecting data.