



National Science Foundation Programs for Education

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Outline

- NSF Programs in EHR/DUE
- NSF Programs in CISE
- Points a proposal should address
- Making your proposal stand out
- Proposal reviewing
- Post-award issues

National Science Foundation: EHR/DUE

- NSF education projects generally focus on the development or implementation of ideas to improve undergraduate education in specific ways
- Two main programs in this area
- CCLI: Course, Curriculum, and Laboratory Improvement: three kinds, \$150K / \$500K / \$2000K
- ATE: Advanced Technological Education: many different kinds, \$25K to \$5000K

CCLI

- <http://www.nsf.gov/pubs/2009/nsf09529/nsf09529.html>
- May 21, 2009 Type 1 – or -- January 13, 2010, Type 2 or 3
- The CCLI program seeks to improve the quality of science, technology, engineering, and mathematics (STEM) education for all undergraduate students. ... efforts to create, adapt, and disseminate new learning materials and teaching strategies, develop faculty expertise, implement educational innovations, assess learning and evaluate innovations, and conduct research on STEM teaching and learning. The program supports three types of projects... ranging from small, exploratory investigations to large, comprehensive projects.

ATE

- <http://www.nsf.gov/pubs/2007/nsf07530/nsf07530.pdf>
- October 15, 2009
- ... emphasis on two-year colleges ... involves partnerships between academic institutions and employers to promote improvement in the education of science and engineering technicians ... supports curriculum development; professional development of college faculty and secondary school teachers; career pathways to two-year colleges from secondary schools and from two-year colleges to four-year institutions; and other activities...

National Science Foundation Programs: CISE

- Two main programs in this area
- CPATH: CIST Pathways to Revitalized Undergraduate Computing Education
- BPC: Broadening Participation in Computing

CPATH

- <http://www.nsf.gov/pubs/2009/nsf09528/nsf09528.html>
- The CPATH program challenges the academic community to identify and define the core computing concepts, methods, technologies and tools to be integrated into promising new undergraduate education models, and to demonstrate effective strategies to develop and assess CT competencies in the relevant learning communities.
- Class I projects 1-3 years, funded up to \$300,000; Class II projects 2-3 years, funded up to \$800,000
- Due date April 28, 2009
- Key program officer is Harriet Taylor

BPC

- <http://www.nsf.gov/pubs/2009/nsf09534/nsf09534.html>
- BPC aims to significantly increase the number of U.S. citizens and permanent residents receiving post secondary degrees in the computing disciplines, with an emphasis on students from communities with longstanding underrepresentation in computing.
- Many different kinds of projects are possible. Alliance awards can range from \$200,000 to \$750,000 per year; Demonstration Projects may be funded up to \$200,000 per year for up to three years; Leveraging, Scaling, or Adapting Awards range from \$100,000 to \$750,000 per year for up to three years.
- Key program officer is Jan Cuny

NSF-Oriented Education Projects

- A project has some specific properties you can use to organize your plans. It
 - Solves a specific problem
 - Has a goal, a plan, and a rationale
 - Has institutional commitment
 - Has a careful understanding of the cost
 - Has a way to know how well it succeeds
 - Has a way to share its results with others
- These give you specific ways to organize your proposal

Let's Walk Through These Points

- Go into some details on each
- See how each point helps you build the story you are trying to tell

The Problem

- In education, the problem is usually about teaching and learning
 - Should existing knowledge or skill be learned better?
 - Should a better teaching or learning technique be found or implemented?
 - Is there new knowledge or skills that need to be introduced?
- In summary, what needs to be changed for the benefit of the student?

The Goal(s)

- Write a broad, overarching statement of your intentions or ambitions
- Express these in terms of focused, specific, measurable objectives that lead to your goals
- These may include skill or concept development, attitude development, success rates, diversity, ...

The Goal(s)

- One specific case, adapted from one of my own proposals:
 - The goal of this project is to develop a supportive set of materials that will assist a computer science instructor in creating and teaching a course in computer graphics for students who are not specialists in computer science.

The Plan

- What will you do?
- How will you do it (including timelines)?
- Who will work with you (including their commitments)?
- What resources are available, and what more will be needed?
- Relate your plan directly to your goals and objectives

Collaborations

- Collaborations are often very important, especially for wide-reaching projects
- They are evidence of others' belief in the project and of its likely use by others
- Describe the collaborations and how they will improve the project
- Show your collaborators' commitment with letters of support

Project Rationale

- Why should someone believe the project is good?
 - Is there a literature to support the project?
 - Is there practice that supports the project?
 - Have you done some preliminary work that shows the value of the project?
- Use support letters from key people in the field

The Institution

- What kind of institution is applying? (you usually cannot apply on your own)
- How does this project fit the nature and goals of the institution?
- Does the institution support the project? How do we know that (support letters)? Is cost-sharing needed and supported?

Measuring Success: Assessment

- How will you evaluate the success of your project as it develops? (Formative)
- How will you evaluate it when it is finished? (Summative)
 - success should match goals
 - success should be concrete and measurable

More on Assessment

- Define specific expected outcomes
 - Student learning
 - Contributions to community knowledge
- Build assessment tools around these outcomes -- it's hard to find a good off-the-shelf assessment tool
- How will you document your observations or measurements?
- Think about a consultant (maybe internal)

Some Evaluation Resources:

- *NSF's User Friendly Handbook for Project Evaluation*

<http://www.nsf.gov/pubs/2002/nsf02057/start.htm>

- Other tools

- Online Evaluation Resource Library (OERL)

<http://oerl.sri.com/>

- Field-Tested Learning Assessment Guide (FLAG)

<http://www.wcer.wisc.edu/archive/cl1/flag/default.asp>

Sharing Your Success: Dissemination

- How will you let others know of your work and how it has improved learning?
- How will you let others replicate your success?
 - publish at educational conferences in your field, i.e. SIGCSE
 - use digital libraries in your field (e.g. CS elements of NSDL)
 - Use custom Web sites, blogs, wikis, ...
 - create a commercial product (e.g. textbook)

Dissemination

- The key point is to build *active* dissemination mechanisms, not passive ones; ordinary Web sites just aren't exciting to reviewers
- Increasingly, the emphasis is on building a *community* around the idea, not simply putting the idea out. This is more work, but more rewarding

The Budget

- Present a careful breakdown of costs in the format needed by the agency, including a rationale for these costs
- Be sure that everything in your budget is within the scope of the funding program
- Look carefully for budget limits and work within them

Gotchas on Budgets

- Watch out for too-general catchall areas
 - Travel and equipment should be specific
 - Avoid “Other” categories unless something doesn’t fit, and then be specific about it in the budget justification
- Be aware of institutional overhead costs
- If the project will cost less than the limit, do not inflate the costs -- be honest (it shows)
- Student salaries look better to reviewers than faculty salaries

Actually Writing the Proposal

- When the program solicitation or GPG gives you a specific outline or asks for specific information, be sure to do what is requested.
- Watch out for details that are specified in the solicitation!
 - Fonts, font size, abstract, layout, number of pages, page numbering, number of appendices, biographical information, ...

Details About Proposals

- NSF proposals have a limit of 15 pages, plus a one-page project summary
- References, budget, biography, and attachments are not included in this count
- A good outline follows the order we presented: problem statement, project goals and plan, rationale, institution, assessment, dissemination, budget
- Be sure of your spelling and grammar!
 - If you are not a native English speaker, or even if you are, have your grants office copyedit the proposal

Your Proposal is a Sales Piece

- It sounds crass to say so, but the proposal's goal is to sell your idea to the agency
 - Make your descriptions strong, positive, and pithy
 - Use short, declarative sentences
 - Emphasize how your work will benefit others
- But *never* exaggerate or spin the truth, because your readers will be experts

Make Your Proposal Stand Out

- Most programs receive many more proposals than they can fund
- Most reviewers read many more proposals than they easily remember
- Make your proposal stand out!
 - Give the project a catchy title with an acronym
 - Emphasize a unique feature of the project
 - Use diagrams, figures, and color

Make Your Ideas Easy to See

- Make sure your presentation has
 - focus
 - simplicity

so the reviewer can easily understand why your ideas are worth funding

Make Sure Your Commitment Shows

- You should be *deeply* committed to this idea
 - whether or not you get the funding
 - whether or not you develop it yourself
- Your commitment should be evident in the way you describe the project and your work with it

Getting Help with Your Proposal

- It can be difficult to know whether a proposal works if you're the only one who reads it
- Get help; have others read your drafts
 - Colleagues who know the institution
 - Friends who know the field
 - Your development office who know proposals

Getting Help

- Consider getting a peer critique
 - Fresh perspective
 - Identify points that are weak or unclear
 - Is the project believable and important?
- Many of us are better at evaluating others' work than our own

How Will Your Proposal be Evaluated?

- Your proposal will be read by a program officer
- Probably it will also be read by reviewers, either singly or in a panel
- Perhaps it will be discussed with others
- All the readers can be expected to be knowledgeable, usually experts, in the area

Funding Rates

- If you can, you should find out the expected funding rate (the percentage of proposals that are funded) of the program you submit to
- A recent NSF-DUE program had 870 proposals and expected to fund 90 to 100, for a funding rate around 11%
- The funding rates may vary widely; if you have a choice, you might want to apply to the less competitive program

The NSF Pattern

- Proposals are sent to a panel of reviewers
 - Each reviewer reads 10-12 proposals
 - Reviewers develop individual recommendations
 - Reviewers form a panel that discusses proposals
- The panel itself may be small (~5 people) or large (~20 people) and a reviewer may not read all proposals
- The panel may develop a recommendation for the program officer, who then makes a recommendation to those who fund

More About Reviewers

- Reviewers make time for reviews in busy schedules and may have only 20 to 30 minutes for their first reading
- Reviewers have a wide range of reviewing experience and are knowledgeable to expert
- Reviewing is a very human process; reviewers range from skeptics to enthusiasts

Instructions to NSF Reviewers

- Just for a moment, let's look over the shoulder of an NSF review panel as they get their instructions for an education program
- A key part of these instructions is the set of *important project features* that program officers want reviewers to look for
- If reviewers are looking for them, it's your job to make sure they're there...

Important Project Features (1)

- **Quality, Relevance, and Impact:**
 - Recognized need or opportunity
 - Produce one or more of: exemplary materials, processes, models, or important assessment and research findings
 - Potential for broad application
 - Advance knowledge and understanding
- **Student Focus:**
 - Clear relation to student learning
 - Students' perspective

Important Project Features (2)

- Use of and Contribution to Knowledge about STEM Education
 - Clear and compelling rationale
 - Methods derived from existing knowledge
 - Effective approach for disseminating results
- Stem Education Community-Building
 - Interactions with others
 - Informal or formal, PI's discipline or others

Important Project Features (3)

- Expected Measurable Outcomes
 - Goals translated into measurable outcomes
 - Outcomes on student learning, contributions to the knowledge base, and community building
- Project Evaluation
 - Formative and summative evaluation
 - Based on expected measurable outcomes
 - Be consistent with the limitations of the NSF program

Some Things Reviewers May Say...

- The concepts discussed here are of potential interest, but do not yet seem well developed.
- It would surprise the reviewer if this hadn't been done before, but no literature search seems to have been done.
- The project faculty seem to be active, but there is no apparent track record for their work.

Some Things Reviewers May Say...

- It was difficult to see just what the eventual outcome of this project would be.
- The project has very limited, passive dissemination and no active outreach.
- It is not at all clear how this project would support women or underrepresented groups.

Other Factors in Recommendation

- The program officer must balance the panel recommendation and the available program budget
- If your project is recommended but funds are limited, the program officer may contact you and ask if you can reduce your budget
- Try to be cooperative, honest, and clear in this conversation

If You Are Not Funded

- Remember the point from an earlier slide:

Don't give up!

- Learn what you can from reviews, from the program officer (ask for information, don't challenge the reviewers), from colleagues, from your SRO
- Try again

Comments from Recent Reviews

- Several proposals that had been submitted before were discussed
 - Some got very good reviews because the proposers had listened to their earlier reviews
 - Some got very low reviews (again...) because the proposers did not listen to and learn from their earlier reviews
- It pays to read your reviews!

If You are Funded

- You will need to work with your institution to set up budget lines for your project
- The institution may have some requirements; be patient with them
- You will probably need to make regular progress reports and a final report, so plan for them

Good Luck!

- I wish you success with your projects and proposals!
- Questions?
- Feel free to send questions to rsc@cs.csustan.edu
- I will be glad to send these slides to anyone