New NSF EHR Programs: EHR Core, IUSE and REAL

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(Back to Page 1)

NSF's Education and Human Resources Directorate is undergoing an extensive reorganization, eliminating number of older programs and introducing three new programs.

As we discussed in last June's issue of the newsletter, STEM education research funding programs across the federal agencies have been undergoing big changes inspired by a new Strategic Plan released on May 31, 2013 by the National Science and Technology Council (NSCT's) Committee on STEM Education (CoSTEM). Among other things, the new Strategic Plan names NSF as the lead agency for improving higher education. As part of NSF's effort to implement the new strategic plan, NSF's Education and Human Resources Directorate (EHR) is in the process of revamping many of its funding programs. The first impact of these changes, much to the distress of PIs across the country, was the elimination of a number of long-standing funding programs, including Transforming Undergraduate Education in STEM (TUES) and the STEM Talent Expansion Program (STEP). Now NSF is in the process of announcing new programs that will take the place of those grant programs as well as offer new opportunities. NSF has held a number of webinars to inform the research community about three new programs: the EHR Core Research Program (ECR), Improving Undergraduate STEM Education (IUSE), and Research on Education and Learning (REAL). Below, we summarize and discuss the information given in these webinars. (Links to webinar slides or recordings are given at the end of this article; the EHR Core program has a final upcoming webinar scheduled for Dec. 18th.)

Following on the release of the Strategic Plan, NSF and the US Department of Education jointly released the Common Guidelines for Education Research and Development in August 2013. These guidelines were discussed in the October issue of our newsletter, and are required reading for anyone planning to submit a proposal to EHR. In particular, you'll find the categories of types of research projects laid out in the Guidelines echoed in the programs we'll describe below. Also, don't forget that a great way to improve your understanding of a new NSF program, assuming you're not ready to submit, is to volunteer to be a reviewer for the program.

The EHR Core Research (ECR) Program

In the past, unlike other NSF directorates, EHR did not have core programs (programs with broad, brief program descriptions that accept a wide range of proposals based investigator-initiated ideas). Instead, EHR programs were all solicitation-based and highly structured. The new EHR Core program signals a fundamental shift away from this highly prescriptive approach and an intensifying focus on education research, either as the sole focus or in concert with implementation of new educational initiatives.

The EHR Core Research Program (ECR) is an EHR directorate-wide program that supports fundamental STEM education research across every division of EHR (i.e., the Division of Graduate Education (DGE), Research on Learning in Formal and Informal Settings (DRL), Undergraduate Education (DUE), and Human Resource Development (HRD). Therefore, ECR will

fund research at all levels, ranging from Pre-K to workforce education. The key distinction is that ECR funds **foundational research**, as defined in the Common Guidelines mentioned earlier. ECR is interested in proposals from all disciplinary communities supported by NSF related to four core areas:

- STEM learning
- STEM learning environments
- STEM workforce development
- Broadening participation in STEM

One reason mentioned in the webinar for establishing the ECR program was to provide a program that addresses all of these core research areas at the foundational level. In the past, a number of programs supported fundamental education research, along with more applied projects, but they were fragmented based on the core areas addressed. For example, the former REESE program (now subsumed into REAL) did not address workforce development. By providing one program, NSF hopes to improve integration of the fundamental education research it supports.

ECR will fund two types of proposals: **core research proposals** (up to $1.5M over 5 years), which will study a foundational research question or issue related to STEM learning and education, and **capacity building proposals** (up to $300K for 3 years), which will support groundwork for advancing research in the four core areas listed above.

There is an emphasis on identifying and addressing the STEM education "grand challenges" in these proposals. And, as with all NSF programs, potential impact is very important; you'll want to emphasize the potential of your proposed research to transform STEM learning and education and contribute to the research knowledge base. Core research proposals should be theory-driven, theory-generating, theory-testing or predictive studies. It is essential that studies are evidence-based. Collaborations are encouraged, particularly those that include the social and behavioral sciences in addition to education. Examples of capacity building proposals cited in the webinar include workshops, sandpits, charrettes, and exploratory/consensus studies.

The ECR solicitation specifies two full proposal target dates: July 12, 2013 (which has passed), and February 4, 2014. After that, the target date is the first Tuesday in February, annually. (Target dates differ from due dates in that you can still submit your proposal after the target date, but review of your proposal may be significantly delayed.)

The Improving STEM Undergraduate Education (IUSE) Program

The IUSE program is funded out of the Division of Undergraduate Education and focuses on increasing student retention in STEM, preparing students to participate in science for tomorrow, improving students' STEM learning outcomes, generating knowledge on how students learn and on effective practice in undergraduate classrooms, and broadening participation. The target date for proposals is February 4, 2014.

IUSE replaces the former NSF **TUES**, **WIDER** and **STEP** programs. (Caution: If you Google these programs, you may still find old solicitations and program pages that indicate that these programs are still active. Don't let that fool you—they are not accepting new proposals.) The

reason NSF decided to make this change was to provide a more open, less prescriptive program that might, for example, allow proposals that combine aspects of projects that might variously have been submitted to these three former programs in years past. In keeping with this philosophy, there is no solicitation for IUSE (a common practice for NSF core programs), but there is a relatively lengthy program synopsis on the IUSE program page. There are also no explicit budget limits, but in the webinar it was stated that most projects will be 1 to 3 years, with up to 5 years being allowed if necessary. Creativity is encouraged, and a strong research component will be expected. There are also no tracks specified and no limit on the number of proposals that can be submitted.

When you apply, you must specify which of the six types of research defined in the Common Guidelines your project fits. *[These are: 1) Foundational Research, 2) Early-Stage or Exploratory Research, 3) Design and Development Research, 4) Efficacy Research, 5) Effectiveness Research, and 6) Scale-up Research.]* While you can submit a proposal that would have fit the former TUES, WIDER or STEP programs, you're also encouraged to be creative and feel free to cross the boundaries of these programs. Remember that the increased emphasis on rigorous educational research means that your proposal won't be competitive if you simply propose to implement and assess a new curriculum or lab. Be sure to describe how your project builds on available evidence and theory, and how it will generate new evidence and build current knowledge related to undergraduate education. Baseline data and a theory of change are also encouraged if they fit the project.

IUSE will be overseen by a number of program officers who are organized by discipline (listed on the program page along with their contact information). In answer to a question asked during the webinar, the presenters said they were not yet sure how proposals will be reviewed but suggested they might use disciplinary panels.

Interestingly, the presenters also briefly mentioned that a Dear Colleague letter will be issued in the next few weeks encouraging Ideas Lab proposals related to IUSE. These proposals will have the same target date as regular IUSE proposals (Feb. 4, 2014) but will be internally reviewed. Similar to other NSF Ideas Lab competitions, individuals will submit applications and those selected will attend an NSF-hosted Ideas Lab in which participants, assisted by professional facilitators, will work to put together multi-institutional teams, which will then submit full IUSE proposals. EHR hosted an Ideas Lab for data-intensive research to improve teaching and learning earlier this year. That solicitation might provide some insight into what to expect for the IUSE Ideas Lab competition.

The Research on Education and Learning (REAL) Program

The REAL program is administered by the Division of Research on Learning in Formal and Informal Settings (DRL) and subsumes the old Research in Evaluation on Education in Science and Engineering (**REESE**), Research on Gender in Science and Engineering (**GSE**) and Research on Disabilities Education (**RDE**) programs. Optional letters of intent for the first REESE competition were due Nov. 13, 2013, and the target date for the first full proposals is Jan. 10, 2014. The program has a solicitation, which you can find here.

REAL funds research on all groups and ages, and includes formal and informal education. The program supports "research that informs efforts to understand, build theory to explain, and suggest interventions and innovations to address persistent challenges in STEM interest, education, learning, and participation." They do not fund curriculum development. The program funds four "strands" of research, but a proposal can reach across more than one strand. These strands are:

- Research on human learning in STEM
- Research on learning in STEM learning environments (e.g., organizational structure, technology, opportunity structures)
- Broadening participation (including underrepresented minorities, women, persons with disabilities, and students from low socioeconomic levels)
- Special emphasis strands (which this year are assessment, undergraduate learning, and technology)

In addition, you must specify into which of six types your proposal fits. These types qualify for different funding levels as follows:

- **Early stage**: up to $500K for 3 years (for projects with no data or with very preliminary or qualitative data)
- **Middle stage**: up to $1.5M for 3 years
- **Later stage**: up to $2.5M for 5 years (for projects that already have evidence and are gathering data for the final push to understand what works and why)
- **Fostering Interdisciplinary Research in Education (FIRE)**: up to $500K for 3 years (for projects that pair an education research with a scientist or engineering so that they can earn from each other. This project is especially meant to help train scientists and engineers to do education research.)
- **Synthesis**: up to $300K for 2 years (for projects that synthesize existing knowledge but package it in a way to provide a direction for moving forward; for example, meta-analyses or a synthesis of what is known in the field)
- **Conferences and workshops**: up to $75K (to develop and host a conference or workshop to catalyze progress on research relevant to REAL)

REAL proposals should include linkages to theory and extant research, a research plan, a discussion of contributions to implementation (where applicable), a discussion of contributions to knowledge, a communication strategy, a data management plan, and a mechanism for obtaining objective external feedback. Proposals should also explain the **purpose** of the research (What are your research questions or hypotheses? How does the research contribute to the evidence base?), the **justification** for the research (What is the policy and practical significance, and what theoretical and/or empirical arguments are there for conducting the study?), **methodology** (What are the key features of the research design, and what are your plans for data collection, analysis, assessment, etc.?), and expected **outcomes** of the research (What theory or empirical evidence will the project produce? How might these products or findings be useful?) You should also provide a timeline for the project and describe the expertise of the people doing the research.

Future Changes

NSF's FY 2014 budget requests $123.08M in funding for a new NSF-wide framework called Catalyzing Advances in Undergraduate STEM Education (CAUSE), which is meant to "provide coherence across all NSF undergraduate education programs." The programs described above will fall within this framework. CAUSE funding is divided in the budget by directorate as follows: $2.5M for BIO, $97.08M for EHR, $12.6M for ENG, and $10.9M for GEO. CAUSE consolidates a number of former programs: STEM Talent Expansion Program (STEP), Widening Implementation and Demonstration of Evidence-Based Reforms (WIDER), Transforming Undergraduate Biology Education (TUBE), Nanotechnology Undergraduate Education (NUE), Geosciences and Opportunities for Enhancing Diversity in Geoscience (OEDG), and Climate Change Education (CCE). It appears that CAUSE will serve to reduce fragmentation of education-related programs across NSF while still allowing the various directorates to fund education programs focused on their disciplines.

CAUSE has been on hold because of the sequester, but with a new federal budget deal on the horizon, we may see some progress in implementing it in the near future. We'll have to wait to see how this all develops, but if you're interested in education-related funding, you'll want to keep an eye on this. In particular, enhanced integration will very likely result in higher expectations in many of the discipline-focused education programs. For example, we expect reviewers will expect increased rigor in areas such as evaluation methodology, logic models, and basing interventions on solid education theory.

Other Resources

IUSE Program Webinar Slides

EHR Core Research Program webinar recording

Transcript of the May 14 NSF EHR Core Research Webinar Presentation

EHR Core Research FAQs

REAL Program Webinar Slides

Slides for Webinar on Gender Research and Disabilities Education Research funding available through REAL

Dear Colleague Letter on gender and disabilities research available through REAL