National Science Foundation
4201 Wilson Boulevard
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NSF 12-050

Frequently Asked Questions: Computing Education for the 21st Century (CE21)

1. **The scope of CE21 seems quite broad. Am I reading it right?**

   Yes. The scope is very broad. We are interested in advancing the knowledge base for the teaching and learning of computing for diverse learners across the academic pipeline, in classrooms and in out-of-school settings, in standalone computing classes, and infused through courses in other disciplines. Please note, however, that there are three distinct tracks in this solicitation and that two of those tracks—CS 10K and Broadening Participation —have more specific targets. CS 10K projects must align with the CS 10K Project. CS 10K aims to introduce a new high school curriculum in computing, centered around the proposed new CS Principles AP course, and to get that curriculum taught by 10,000 well-prepared teachers in 10,000 schools by 2016. For further descriptions of the CS 10K effort, see:

   - http://csprinciples.org, which gives information on the NSF award to the College Board that funded the initial development of the course and its ongoing pilots;
   - http://www.collegeboard.com/csprinciples, which provides detailed information on the course framework;
   - http://csprinciples.cs.washington.edu, which provides information on the five 2010-2011 pilots of the course; and
   - http://computingportal.org/cs10k, which contains resources on the larger, CS 10K Project.

   BP projects must focus on the engagement and retention of students from underrepresented groups, including women, African Americans, Hispanics, Native Americans, and persons with disabilities.

2. **Will CE 21 support education at the elementary and middle school levels?**

   Yes, but the CS 10K track focuses on high school, and that emphasis will affect the balance of awarded projects in our portfolio. Certainly it is important to introduce the concepts of computational thinking at a very early age, but any successes that we have in engaging students in elementary and middle school will be lost if they see no academic computing curriculum in their four years of high school. Likewise, any improvements we make at the college level will have little impact if students don't sign up for initial computing courses.

3. **Much of the work of the Demonstration Projects funded under the previous Broadening Participation in Computing program was on engagement and retention. Are interventions aimed at engagement and retention appropriate for the CE21 program?**

   Yes. Engagement and retention are crucial. Many of the BPC projects looked at culturally-sensitive ways to engage students from specific demographics and those efforts are important to CE21 as well, particularly within the BP track. To be funded under CE21 though, engagement and retention efforts will also have to build the capacity of the students. CE21 BP proposers should describe relevant education research, delineate what computational concepts they are teaching through their activities, and describe how they will measure their successes.

4. **As a computer scientist, I'm a little unsure of what is meant by "education research."**

   Education research is basic or applied research conducted to advance knowledge in the field of education or bearing on educational problems. A successful CE21 Computing Education Research proposal must have a comprehensive research plan. To be effective, the plan should begin with a focused, evidence-based hypothesis about how participation and education in computing will be affected and improved through the proposed effort. It should articulate clear goals and describe in considerable detail the research methodology, needed instruments, and planned approaches to analysis. All CER proposal teams should include educational researchers with the appropriate expertise.

5. **I am interested in using computation in novel ways in STEM classrooms. Would that be in the scope of CE21?**

   Maybe not. With the CE21 solicitation, we aim to get students engaged in computing, aware of the range of computing careers and applications, and well-prepared to begin a college major in computing-related or computationally intensive fields. We want to prepare students to be creators, not just users, of technology. If the primary focus of your work is using technology to advance learning, you might better apply to the Cyberlearning: Transforming Education (NSF 11-587) solicitation. If the primary focus of your work is to teach computing or computational thinking and you are using technology as a tool to accomplish that, then CE21 would be appropriate.

6. **Should K-12 teachers be included in the project team?**

   The answer is "yes," if your project includes work in K-12. Your team should contain expertise on all of the critical elements of the proposal. For the K-12 arena, that almost certainly includes K-12 teaching expertise. You should also be sure that your project has the support of the principals and administrators in any schools that you are planning to work in (and demonstrate that with appropriate letters of support).

7. **Should proposals include letters of support?**

   Yes, but only where necessary to document partnerships. Having large numbers of letters of support does not help your review prospects and may hurt them by detracting attention from the significant letters that do strengthen your case. Letters should demonstrate that you have the level of support from your partners that you need to carry out your project, as proposed. Meaningful (not *pro forma*) letters from, for example, principals, superintendents,

department heads, and appropriate industry representatives should be included. Letters of support are not needed from PIs or CoPIs, though their responsibilities should be clear from the Project Description.

8. **Are there limitations on what can be included in the Supplementary Documents section of the proposal?**

   Yes. The Supplementary Documents must include a Data Management Plan. If the proposal includes funding for a postdoctoral student, a PostDoc mentoring plan must also be included. Other than that the only documents that can appear are letters of support as described above.

9. **There are other related NSF programs. How do they differ?**

   There are a number of other closely-related NSF programs that may be a better fit for your proposed work. They include:

   - **Advanced Technological Education (ATE), NSF 11-692**. With an emphasis on two-year colleges, the ATE program focuses on the education of technicians for high-technology fields. It supports curriculum development, professional development of college faculty and secondary school teachers, career pathways to two-year colleges from secondary schools, and career pathways to four-year institutions from two-year colleges.
   - **Cyberlearning: Transforming Education, NSF 11-587**. Cyberlearning supports research that explores the opportunities for learning made possible by new technologies: helping learners capitalize on those opportunities, developing new practices that they enable, and investigating how they can be used to promote deep and lasting learning of content, practices, skills, attitudes, and/or dispositions needed for engaged and productive citizenship.
   - **Discovery Research K-12 (DR K-12), NSF 11-588**. DR K-12 seeks significant advances in student and teacher learning of the STEM disciplines. Its projects begin with a research question or hypothesis about how to improve pre-K-12 STEM education with innovative educational resources, models, or technologies, and then they develop, implement and study the effects of those innovations.
   - **Innovative Technology Experiences for Students and Teachers (ITEST), NSF 11-525.** ITEST seeks mechanisms to ensure the breadth and depth of the STEM workforce. A large variety of possible approaches and implementation models for building students' capacity to participate in the STEM workforce and their scale-up can be implemented and studied. The ITEST Solicitation is being revised.
   - **Math and Science Partnership (MSP), NSF 12-518.** The MSP program supports innovative partnerships to improve K-12 student achievement in mathematics and science. MSP projects are expected to raise the achievement levels of all students and significantly reduce achievement gaps in the mathematics and science performance of diverse student populations. MSP projects contribute to what is known in mathematics and science education and serve as models that have a sufficiently strong evidence/research base to improve the mathematics and science education outcomes for all students.
   - **Robert Noyce Teacher Scholarship Program, NSF 12-525.** The Noyce program aims to encourage talented STEM majors and professionals to become K-12 mathematics and science teachers. It provides funds to institutions to support scholarships, stipends, and academic programs for students who earn teaching credentials and commit to teaching in high-need K-12 school districts. It also supports STEM professionals who enroll in master's degree programs leading to teacher certification, and professional development for exemplary mathematics and science teachers to become Master Teachers.
   - **Transforming Undergraduate Education in STEM (TUES), NSF 10-544.** TUES projects contribute to the development of exemplary undergraduate STEM education. Typically projects create learning materials and strategies, implement new instructional strategies, develop faculty expertise, design assessments and evaluations of student achievement, and/or conduct research on undergraduate STEM education.