CS 10K: Mobilizing the Computing Community

Jan Cuny, NSF
June 8, 2011
By 2018, there will be 1.4 million computer specialist job openings.

US universities will have generated enough graduates to fill about 1/3 of these openings.

—NCWIT, By the Numbers, 2009
Strong Predicted Job Growth

Percentage of New STEM Jobs by Area Through 2018

- Computing: 71%
- Traditional Engineering: 16%
- Physical Sciences: 7%
- Mathematics: 2%
- Life Sciences: 4%
- Computer Support: 7%
- Database Admin.: 2%
- Systems Analysis: 10%
- Software Engineering: 27%
- Computer Networking: 21%
- Other Computing: 3%
- CS/IS Research: 1%

... and they’re good jobs
Challenges

• Low student interest
Intended CS majors

Data source: HERI, Slide: NCWIT
CS & CE Majors

—CRA Taulbee Survey, 2011
Challenges

• Low student interest
• Dismal engagement of minorities, women & persons with disabilities
2010 AP Gender Gap

Statistics

Calculus

Computer Science

Biology

—College Board, 2010
The Missing 70%
How do we compare on gender?

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**Percent Women by Field and Degree Level**

2007 Degree Conferrals

- **Parity Line: 50%**

Field and Level:
- Biological Sciences
- Computer and Information Sciences
- Engineering
- Mathematics
- Physical Sciences
- Psychology
- Social Sciences

CPST, 2008
How do we compare on minorities?

Percent URM by Field and Degree Level
2007 Degree Conferrals

Parity Line: 28%
The Trend

Change in Percentage of Women and URM’s Obtaining Associate’s, Bachelor’s, Master’s and Doctorate Degrees 1986 - 2005

Source: National Center for Education Statistics, Digest of Education Statistics
Challenges

• Low student interest
• Dismal engagement of minorities, women & persons with disabilities
• Negligible presence in K-12
  - Lack of an educational research base
  - Academic computing not available in most high schools
The percentage of U.S. students taking STEM courses has increased over the last 20 years for all STEM disciplines except computer science, where participation dropped from 25% to 19%.

2009 NAEP High School Transcript Study
High School Participation in AP STEM Disciplines

![Chart showing the number of AP tests taken in various STEM disciplines from 1997 to 2010.](chart.png)

Source: College Board Exam Volume Data

*Computer Science up until 2000 had an A and AB test as of 2010 they are only offering the AB test.
High School is Key
Why High School?

• We need to do much better there.
• Without the HS piece, anything we do for middle school will be lost.
• Without the HS piece, anything we do at the college level will be insufficient.
CS 10K Project

Develop an effective new high school computing curriculum and get it taught in 10,000 schools by 10,000 well-prepared teachers by 2015.

Featuring a new CS AP course, CS Principles
CS Principles

• Engaging, accessible, inspiring, rigorous

• Focused on the fundamental concepts of computing (CT)
Pilots

2010-11

• Berkeley, Dan Garcia
• Metro State Denver, Jody Paul
• UC San Diego, Beth Simon
• UNC Charlotte, Tiffany Barnes
• University of Washington, Larry Snyder

2011-12

• ~18 colleges
• ~36 high schools
Beyond the AP Curriculum

- Additional course models
- Standards & assessments
- Teacher preparation \times 10,000
- Entrée into schools

Accomplishing all of this is beyond NSF’s mission and resources!
Exploring Computer Science

- LAUSD, Jane Margolis
- Piloted ECS 08/09
- ~20 LAUSD schools 10/11
- Spreading in CA and CALCSEPOL
- Complete, detailed curriculum & lessons plans on CSTA site
- Google collaboration around data & CENS participatory science cell phone apps
- “G” credit and CTE credit
Computing Community Involvement

Departments
- Pilot the course; Work with Ed Schools; Train and mentor Teachers; Talk to students about HS teaching;

Companies and Foundations
- Join CS 10K Private/Public Partnership; Join C in C; Get involved in CS Ed Week activities; Build a cluster

Individuals
- Advocate in state, local colleges and high schools; Join/Found a CSTA Chapter; Support local teachers (bring students); Do something related for CS Ed Week 2011; Build a cluster
Right now I need ....

Help with mail reviews of single proposals from both university faculty & high school teachers.

Volunteer: jcuny@nsf.gov
Computing Education for the 21st Century (CE21)

CONTACTS

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PROGRAM GUIDELINES

Solicitation 10-619

Please be advised that the NSF Proposal & Award Policies & Procedures Guide (PAPPG) includes guidelines implementing the mentoring provisions of the America COMPETES Act (ACA) (Pub. L. No. 110-69, Aug. 9, 2007.) As specified in the ACA, each proposal that requests funding to support postdoctoral researchers must include a description of the mentoring activities that will be provided for such individuals. Proposals that do not comply with this requirement will be returned without review (see the PAPP Guide Part I: Grant Proposal Guide Chapter II for further information about the implementation of this requirement).

DUE DATES
Thanks!

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