



**DIGITALLY ENHANCING AMERICA'S COMMUNITY COLLEGES**  
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**STRATEGIC OPPORTUNITIES FOR COMPUTING EDUCATION**

Report of Findings  
from the 2010  
*Strategic Summit on the Computing Education Challenges at Community Colleges*  
sponsored by the National Science Foundation  
and the Association for Computing Machinery

**ACM**  
**Committee for Computing Education in Community Colleges**  
[www.capspace.org](http://www.capspace.org)

**STRATEGIC PLANNING MATERIALS**  
**Strategic Planning Template**  
**Potential Strategic Planning Initiatives**  
**Potential Funding Opportunities**

## ► ► ► Strategic Planning Template

The intent of the *Strategic Summit on the Computing Education Challenges at Community Colleges*, and therefore of the report “Digitally Enhancing America’s Community Colleges ► ► ► Strategic Opportunities for Computing Education”, is to spur grant proposals, initiatives and partnership activities led by community college computing faculty and academic administrators. To that end, the Findings are also available in a poster-sized strategic-planning format intended to foster interactive discussion, collaboration and follow-up activities. To obtain your Strategic Planning Template, submit a request via the “Contact Us” form at the ACM CCECC website ([www.capspace.org/contactus](http://www.capspace.org/contactus)). A preview of the Template is available at [www.capspace.org/StrtgcPlnngTmplt](http://www.capspace.org/StrtgcPlnngTmplt).

## ► ► ► Potential Strategic Planning Initiatives

The potential initiatives identified below are intended to spur ideas for populating the strategic planning template, as institutions act on the “Opportunities” identified in the Report.

### **Finding**

### **Potential Initiatives**

- Promoting Computing Education in Community Colleges
  - standardize assessment-based articulation agreements
  - establish credit in escrow agreements with high schools
  - establish programs in emerging technologies
  - establish community-based experiential learning opportunities
- Embedding Computing Education in Our Changing Society
  - create role-based simulations focused on ethical dilemmas
  - engage students in a needs analysis of the local labor market
  - tailor computing learning modules to serve other disciplines, such as natural science, social science, humanities, healthcare and education
  - establish curricular and learning activities centered around sustainable computing
  - establish cybersecurity associate-degree programs
- Demystifying Computing Disciplines and Professions
  - standardize computing nomenclature and learning outcomes
  - organize mentoring and information sessions for middle and high school students on career opportunities in computing
  - standardize education and career pathways in computing
  - engage local business and industry in DACUM activities for emerging technologies
- Actualizing Pathways in Computing Education
  - organize mentoring and information sessions for middle and high school students on career opportunities in computing
  - create opportunities for experiential learning, online learning, blended learning, and portfolio and authentic assessment
  - utilize alternative and virtual learning environments create online tutoring services and user self-service advisement systems

- ▶ Assessing Incoming Computing Students
  - ▶ create self-guided web-based tools that enable students to assess their computing competencies
  - ▶ identify multi-entry points into computing degree programs
  - ▶ create self-paced learning modules to fill the gaps in student preparedness
- ▶ Facilitating Student Completion of Computing Programs
  - ▶ create self-guided web-based tools that enable students to chart their own educational pathways
  - ▶ standardize education and career pathways in computing
  - ▶ establish well-defined entry and exit competencies in computing
  - ▶ create alternatives to traditional semester-long courses
  - ▶ create opportunities for experiential learning, online learning, blended learning, and portfolio and authentic assessment
  - ▶ utilize alternative and virtual learning environments
  - ▶ create online tutoring services and user self-service advisement
- ▶ Cultivating Student Diversity in Computing
  - ▶ create mentoring and peer support mechanisms
  - ▶ use tools designed to attract and retain middle school girls to computing, such as storytelling Alice
  - ▶ hire faculty of diverse backgrounds
  - ▶ create outreach activities to middle and high schools to promote interest in computing, such as programming contests and robotics competitions
- ▶ Engaging Computing Students of Tomorrow
  - ▶ embed structured learning activities into alternative virtual learning environments
  - ▶ incorporate students' personal mobile technologies into both online and classroom activities
  - ▶ coordinate learning activities with the digital comfort zone of students
  - ▶ create game simulations that promote specific learning outcomes in computing
- ▶ Applying Learning Research to Computing Education
  - ▶ partner with researchers in cognitive learning to create alternative pedagogy models for the learning style of millennial students
  - ▶ use active learning approaches in computing courses
  - ▶ catalog and design authentic assessment activities for the inductive and deductive reasoning skills required of computing professionals
- ▶ Pioneering Assessment Strategies for Computing Coursework
  - ▶ provide students with adaptive self-assessment tools
  - ▶ involve students in group learning and peer assessment activities
  - ▶ prototype innovative and authentic assessment techniques
- ▶ Innovating Instructional Materials for Computing Courses
  - ▶ create learning materials that engage students with Web 2.0 technologies
  - ▶ have students create online videos and blogs to support course content
  - ▶ partner with industry to share web-based training resources
  - ▶ incorporate electronic books and tablet computing into pedagogy

- ▶ Embracing Anytime, Anywhere Computing Education
  - ▶ redesign instructional materials for interaction with mobile devices
  - ▶ provide self-guided web-based learning modules accessible anytime
  - ▶ create a database of Twitter-based flash cards of computing terms
  - ▶ create online polling systems built on text responses
- ▶ Keeping Infrastructure Current for Computing Programs
  - ▶ employ streaming applications and virtualized computing environments
  - ▶ create learning commons and informal learning spaces for computing education
  - ▶ partner with industry to provide students with authentic learning experiences
- ▶ Preparing Students for the Computing Careers of the Future
  - ▶ engage students in undergraduate research experiences
  - ▶ provide students with capstone course experiences
  - ▶ instill in students entrepreneurial skills
  - ▶ create learning activities that foster business process awareness
- ▶ Addressing the Comprehensive Needs of Employers
  - ▶ provide online simulations to teach soft skills
  - ▶ employ group learning activities that use virtual teams
  - ▶ establish mentoring relationships between students and computing practitioners
- ▶ Responding to Competing Demands on Computing Curricula
  - ▶ engage local business and industry in DACUM activities for emerging technologies
  - ▶ standardize assessment-based articulation agreements
- ▶ Contextualizing Computing Studies
  - ▶ partner with industry to provide students with authentic learning experiences
  - ▶ provide internship opportunities for students
  - ▶ create learning communities between mathematics and computing courses
  - ▶ create cross-discipline learning activities between mathematics and computing
- ▶ Serving Professional Development Needs of Computing Faculty
  - ▶ partner with business and industry to provide faculty externships and other professional development opportunities
  - ▶ create online communities of practice to share teaching strategies and assessment techniques
  - ▶ create a series of short-term internal sabbaticals
  - ▶ establish inter-institutional exchange programs for community college computing faculty
- ▶ Attracting and Sustaining Computing Faculty
  - ▶ create a mentoring program to nurture successful adjunct faculty from industry with classroom management and pedagogical strategies
  - ▶ partner with business to create reverse externships whereby practitioners spend a semester in a full-time teaching capacity
  - ▶ establish programs that enable individuals leaving industry to transition to second careers in education

- ▶ Meeting the Unique Needs of Computing Departments
  - ▶ create online communities of practice to share teaching strategies and assessment techniques
  - ▶ partner with business to create reverse externships whereby practitioners spend a semester in a fulltime teaching capacity
  - ▶ utilize consortia agreements to offer advanced computing courses via an online course sharing model among education institutions
  - ▶ train adjunct faculty from industry with technical expertise to be effective classroom and online teachers

## ▶ ▶ ▶ Potential Funding Opportunities

### The National Science Foundation

The National Science Foundation provides a great many funding opportunities across several domains and targeted to a variety of goals. Interested parties can find funding (<http://nsf.gov/funding/>) via targeted searches.

- With an emphasis on two-year colleges, the NSF Advanced Technological Education ([http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5464](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5464)) (ATE) program focuses on the education of technicians for the high-technology fields that drive our nation's economy. The program involves partnerships between academic institutions and employers to promote improvement in the education of science and engineering technicians at the undergraduate and secondary school levels. The ATE program 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. Another goal is articulation between two-year and four-year programs for K-12 prospective teachers that focus on technological education. The program also invites proposals focusing on research to advance the knowledge base related to technician education.
  - ATE Central (<http://atecentral.net/>) is a freely available online portal and collection of materials and services that highlight the work of the ATE projects and centers. These NSF-funded initiatives work with educators from two-year colleges to develop and implement ideas for improving the skills of technicians and the educators who teach them. ATE Central is designed to help educators, students, and the general public to learn about, and use materials from, the entire depth and breadth of the Advanced Technological Education program.
  - “Evalu-ATE” (<http://evalu-ate.org/>) promotes the goals of the Advanced Technological Education program by partnering with ATE projects and centers to strengthen the program's evaluation knowledge base, expand the use of exemplary evaluation practices, and support the continuous improvement of technician education throughout the nation.

- The NSF Guide for Proposal Writing (<http://www.nsf.gov/pubs/2004/nsf04016/nsf04016.pdf>) and the materials from the NSF workshop on Writing Proposals to Meet NSF's Expectations ([http://www.nsf.gov/events/event\\_summ.jsp?cntn\\_id=111743&org=DUE](http://www.nsf.gov/events/event_summ.jsp?cntn_id=111743&org=DUE)) offer valuable advice to novice grant writers.

### **Grants.Gov**

Grants.gov (<http://www.grants.gov/>) is an excellent source to find and apply for federal grants. The U.S. Department of Health and Human Services is the managing partner for Grants.gov, an initiative that has had a very positive impact on the grant community.

### **The United States Department of Labor**

- Employment and Training (ETA): ETA administers financial assistance programs pursuant to the Workforce Investment Act, administering State formula grant programs for youth, adults and dislocated workers, national emergency grants for workers affected by mass layoffs, plant closures, and disasters; grant programs for workers with disabilities, Indians and Native Americans, and for migrant and seasonal farm workers. ETA also administers grant programs for older American workers, apprenticeship programs, Trade Adjustment Assistance programs, and assistance for research and development of workforce programs. In addition, ETA is responsible for the operation and maintenance of a national system of public employment service offices and for the national unemployment insurance program.
- Mine Safety and Health: provides grants for research, education and training programs to ensure an adequate and competent staff of trained inspectors; and assistance for establishing or improving State mine health and safety programs through technical assistance.
- Occupational Safety and Health: provides grants to non-profit organizations to provide training, educational services, and technical assistance; assistance to states to administer and enforce state programs; assistance to states to provide occupational safety and health technical assistance and consultant services.
- Office of Disability Employment Policy: The Office of Disability Employment Policy awards competitive grants establishing short-term pilot and technical assistance projects designed to identify, develop, test, evaluate, and disseminate policies to increase employment by expanding access to training, education, employment supports, assistive and systems technology, integrated employment, entrepreneurial development, and small business opportunities for adults and youth with disabilities. Current pilot projects focus on customized employment, Olmstead populations, and innovative demonstration youth grants, among others. Solicitations for grant applications are published in the Federal Register and announced at [www.dol.gov/odep](http://www.dol.gov/odep). ODEP grants are awarded by the OASAM grant office (<http://www.dol.gov/oasam/grants/grants-oasam.htm>).
- Veterans' Employment and Training (VETS): provides special employment and training assistance for veterans through the Disabled Veterans' Outreach Program (DVOP) Solicitation for Grant Applications (<http://www.dol.gov/vets/grants/grants/main.htm>); the Local Veterans' Employment Representative Program (LVER) (<http://www.dol.gov/vets/grants/grants/main.htm>); Veterans' Workforce Investment Program (VWIP) (<http://www.dol.gov/vets/grants/grants/main.htm>); elaws Advisor on veterans' employment and reemployment rights (<http://www.dol.gov/elaws/vets/vetpref/choice.htm>); and the Homeless Veterans Reintegration

Project (HVRP) (<http://www.dol.gov/vets/grants/grant2/main.htm>). VETS grants are awarded by the OASAM grant office (<http://www.dol.gov/oasam/grants/grants-oasam.htm>).

### **The United States Department of Education**

A major responsibility of the U.S. Department of Education (ED) is the administration of programs. To help educators, policymakers, and citizens understand these programs, ED publishes each year a Guide to U.S. Department of Education Programs (<http://www2.ed.gov/programs/gtep/gtep.pdf>). You can also use ED.gov (<http://www.ed.gov/>) to find information about ED programs - their purpose, funding, contacts, and more. A variety of related resources can also be found in the Grants section of the CFO office (<http://www2.ed.gov/about/offices/list/ocfo/grants/grants.html>).

### **The United States Department of Energy**

Much of the work of the Department of Energy's Office of Science is supported through grants and contractual vehicles. This work is processed through the Office of Science, Office of Grants and Contracts Support (<http://science.doe.gov/grants/index.asp>) which serves as the principal acquisition, financial assistance (grants and cooperative agreements) and contract/grant management advisor to the Director of Science.

### **The United States Department of Homeland Security**

The Department of Homeland Security (<http://www.dhs.gov/index.shtm>) provides grant opportunities to states, territories, urban areas and transportation agencies under programs to bolster national preparedness and to protect critical infrastructure.