National Science Foundation Division of Undergraduate Education
Programs supporting Community Colleges Primarily or That Include a Significant Number of Community College Awardees
(as mentioned in accompanying article)

Brief Description of Programs

Advanced Technological Education (ATE): With an emphasis on community colleges, this program promotes improvement in the education of science and engineering technicians at the undergraduate and secondary school level and the educators who prepare them, focusing on technicians for high-technology fields that drive the nation's economy. There are three tracks within the program: projects, centers, and targeted research on technician education. The program encourages partnerships between industry, business, government, and other educational institutions. Currently has 276 active awards, 188 to community colleges.
http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5464&org=DUE&from=home

Robert Noyce Teacher Scholarship Program (Noyce): Seeks to encourage talented science, technology, engineering, and mathematics (STEM) majors and professionals to become K-12 mathematics and science teachers. The program provides funds to institutions of higher education to support scholarships, stipends, and programs for students who commit to teaching in high-need K-12 school districts. Currently has 260 active awards, 4 to community colleges,19 to other institutions of higher education that are partnering with community colleges.
http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5733&org=DUE&from=home

Scholarships in Science, Technology, Engineering and Mathematics (S-STEM): Makes grants to institutions of higher education to support scholarships for academically talented, financially needy students, enabling them to enter the workforce following completion of an associate, baccalaureate, or graduate level degree in science and engineering disciplines. Currently has 534 active awards, 111 to community colleges.
http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5257&org=DUE&from=home

Science, Technology, Engineering and Mathematics Talent Expansion (STEP): Seeks to increase the number of students receiving associate or baccalaureate degrees in established or emerging fields within STEM. Two types of projects are supported, those aimed at implementing strategies that will lead to an increase in the number of students obtaining STEM degrees (Type 1) and those that conduct educational research on degree attainment in STEM (Type 2). A major focus of the Type 1 projects is to make changes in the first-year college experience. Currently has 152 active awards, 30 to community colleges, 31 to other institutions of higher education that are partnering with community colleges.
http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5488&org=DUE&from=home

Transforming Undergraduate education in Science, Technology, engineering and Mathematics (TUES) (formerly CCLI): Seeks to increase the effectiveness of undergraduate education through improved quality, content, and conduct of STEM courses, curricula, and laboratories by creating new learning materials and teaching strategies, developing faculty expertise, implementing educational innovations, assessing learning and evaluating innovations, conducting research on STEM teaching and learning. Proposals are categorized into different levels (Type 1, Type 2, and Type 3) depending on the scale and the scope of the work. There are currently 1056 active awards in TUES programs, 40 awarded to community colleges; 70 to other institutions of higher education that are partnering with community colleges.
http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5741&org=DUE&from=home

Many of the above programs offer additional funding (up to about 25%of the usual amount that may be requested) if a four-year institution involves a two year institution in a substantive role on a project. This amount ranges from $50,000 for a TUES Type 1 proposal to $250,000 for a Noyce proposal. It is expected that the distribution of efforts and funds between the four-year institution and the two year institution reflects a genuine collaboration. Based on funded NSF projects, characteristics of a genuine partnership are:

(1) Both parties contribute and exchange knowledge and ideas and have a true sense of both having contributed to and benefitted from the partnership.
(2) As needed and appropriate, funds are allocated to the community college for instrumentation, materials and supplies and release time for faculty
(3) Materials developed are tested at both the 4-year and the 2-year schools.
(4) Dissemination efforts attempt to engage both the four-year and community college communities. Both the discipline professional societies and societies or meetings that community college faculty attend such as the League for Innovation Conference may be targeted for dissemination of project results http://www.league.org/index.cfm.

Examples of Funded Partnership Projects

0942489 (CCLI Type 1) *CCB FEST: Community College Biology Faculty Enhancement through Scientific Teaching*-A collaborative project between San Francisco State University and Foothill-DeAnza Community College District that is establishing a faculty enhancement program for community college biology faculty. The structure and content of the program is patterned after the Scientific Teaching Institutes organized by Jo Handelsman at the University of Wisconsin. (Tanner, San Francisco State University)

1021443 (CCLI Type 2) *CREATE Cornerstone-Inspiring undergraduates to persist and succeed in the Biology major*. A series of workshops in which biology faculty from both two and four year schools learn to use primary literature to help freshman biology students discover that science is a creative field open to all students whether or not they choose research careers. An example of a project that uses presentation at the League of Innovation, a meeting populated mainly by community college faculty, to disseminate its existence and value to that population. (Hoskins, CUNY).

0816515 (CCLI Type 2) *Community College Undergraduate Research: A Model of Integration*-This project involves the design, implementation and evaluation of a model for integrating undergraduate research into a community college science curriculum. The project involves the use of scientific principles contained within a portfolio of ongoing research programs to develop inquiry-based educational materials (such as problem-based learning modules and case studies) for freshman biology courses. These materials are then being expanded into an undergraduate research experience within a credit-bearing, transferable, advanced sophomore-level course. The project involves a collaboration of five community colleges, one four-year school, four environmental research organizations, and a state government agency.

0717676 (CCLI Type 3) *Project Kaleidoscope: Encouraging Collaborations for Developing Undergraduate STEM Faculty* (http://serc.carleton.edu/sp/pkal/mnscu/index.html) -This collaborative project between Project Kaleidoscope (PKAL) and the Minnesota State Colleges and Universities (MnSCU)was initated to integrate active learning into the classroom and campus culture with a focus on STEM disciplines in both 4- and 2-year colleges. As part of this project, Minnesota biology faculty led a project designed to define what students must know, understand

and be able to demonstrate after completing a degree in biology. http://www.luminafoundation.org/our_work/tuning/Q_and_A-Bologna_and_Tuning.html.

Direct Funding to Community Colleges

The majority of awards made directly and/or solely to community colleges are funded through the Advanced Technology Education (ATE) program. There are currently 219 active awards to community colleges valued at more than $151 million (active award data based on information provided by NSF FastLane system on May 3, 2010). Within the ATE program, biotechnology-oriented projects are most relevant to this article. Many of these projects are examples of exemplary biology education and are worth investigating since they provide examples of student-centered teaching that is competency-based and embedded in "real world" examples. These biotechnology education projects emphasize the "to do" of science rather than the "told how to do".

ATE 0903317 *Bio-Link: Next Generation National ATE Center for Biotechnology and Life Science* –This center is designed to meet the rapidly changing needs of the biotechnology and related life science industries and prospective technical workforce. It is a good source of applied bioscience curricular materials and professional development opportunities and it nationally networks programs at the secondary school, community college and four-year levels.

ATE 1003649 Serving Industry through Education: Student Mentoring and Research Techniques –This project broadens student involvement in undergraduate research and establishes undergraduate research as an essential component of a community college to better prepare students as future employees of the region's biotechnology industry. (Balke, Delaware Technical & Community College Stanton-Newark Campus).

ATE 1003292 A Biomanufacturing Enterprise for Innovative Student Training and Entrepreneurship. This project creates a faculty and industry mentored, student-run contract manufacturing organization where students master competencies essential to a laboratory by preparing products that are needed both by the community college biotechnology program and the neighboring high school biology and biotechnology programs. (Ngan-Winward, Salt Lake Community College)

ATE 1003807 Tropical Ornamental Mariculture Technician Certificate. Students learn how to grow coral and breed tropical fish for the purpose of maintaining them in ornamental settings thus eliminating the need to harvest them from the wild. The project works with South Eastern Aquatechnologies, Inc., The Coral Restoration Foundation, Mote Tropical Research Laboratory and Atlantic Reef Aquaculture. (Rice, Florida Keys Community College)

Resources to Find Out More About Community Colleges

The American Association for Community Colleges web page, newspaper and journal:
http://www.aacc.nche.edu/Pages/default.aspx, its web page
The *Community College Times*, its newspaper, published biweekly
The *Community College Journal* its journal, published bimonthly

The League for Innovation in the Community College web page and annual meetings,
http://www.league.org/index.cfm

Community College Research Center at Columbia University, http://ccrc.tc.columbia.edu/Collection.asp?cid=27.

"Undergraduate Research at Community Colleges", B.D. Cejda and N. Hensel. 2009. ISBN 0-941933-29-6. This publication from the Council on Undergraduate Research describes several projects that serve as models for getting students at 2-year colleges involved in research.

(http://www.aacc.nche.edu/Resources/aaccprograms/ate/Documents/biotech_report.pdf) Report from an April 28-30, 2008 conference, Educating Biotechnicians for Future Industry Needs A conference to determine how best to strengthen technician education within the next five years within the areas of health, agriculture, industry, and environmental biotechnology, and emerging areas. The participants were from higher education, secondary schools, industry, government, and professional organizations.

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