

The NSF Advanced Technological Education Program

National Association for Workforce Improvement

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Disclaimer

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Middle Skill Occupations

- **Although there is unemployment many jobs go unfilled**
- **45% of job openings need middle skills**
- **Not well advertized**
- **Jobs are both destinations and stepping stones**
- **Require some post secondary education**



Middle Skill Occupations

- **Science and Engineering Technicians**
- **First Line Supervisors**
- **Inspectors**
- **Machinists and Industrial Maintenance**
- **Welders**
- **Policemen and Firemen**
- **Medical Technicians**





Community Colleges in the US

Most new jobs will require some postsecondary education

- **Maintain open access to postsecondary education**
- **Prepare students for transfer to four year colleges and universities - teachers**
- **Prepare students for the workplace – 21st Century Skills**
- **Provide non-credit courses – English as a second language, remedial mathematics, skills upgrading, enrichment programs.**

ADVANCED TECHNOLOGICAL EDUCATION

The ATE 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. The program, in its 17th year, focuses on two-year colleges and expects two-year colleges to have a leadership role in all projects.



ATE Program Budget

➤ Funding

- \$51.6 million FY 2009
 - 70% goes to community colleges
- \$64.0 million in FY 10
- Toward \$100 million in FY13

➤ Receive

- 180 Preliminary Proposals – encourage 65%
- 275 Proposals - Fund about 25-30%



TECHNICIAN OCCUPATIONS



- **Bio-Related: BioTech, Agriculture, Environment**
- **Energy Related: Alternative Fuels, Sustainability, Processes**
- **Electronics: Nanotech, Optics**
- **Engineering Technologies: Maritime**
- **Information Systems: GIS/GPS, Cyber Security, Telecommunications**
- **Manufacturing: Automotive, Machining, Mechatronics, Medical Devices**
- **Teacher Preparation**
- **Research and Evaluation**



ATE Tracks

1. Centers: 45% of funding

National 9

Resource 11

Regional 18

2. Projects including small projects 220 - 42 %

3. Targeted Educational Research 6 - 4%



Small Grants

for Institutions New to ATE

- **To stimulate implementation, adaptation, and innovation in all areas supported by ATE.**
- **Broaden the base of participation of community colleges in ATE.**
- **Strengthen the role of community colleges in meeting needs of business and industry**
- **Proposers are encouraged to include resources of ATE and other NSF awardees and to include those people as consultants and subawardees.**
- **Limited to \$200,000 with a maximum of 10% indirect**
- **Available only to community college campuses that have not an ATE award within the last 10 years**

Targeted Research in Technician Education

- **Supports research on technician education, employment trends, changing role of technicians in the workplace, and other topics that make technician programs more effective and forward looking.**
- **Represents a TRUE collaboration reflected in activities, leadership, and budget between well-qualified researchers and two-year college educators and others as appropriate.**



ATE National Centers



- **Articulate a vision for technological education in the future in a specific field**
- **Provide a vision for how to reach and sustain it**
- **Provides leadership and mentorship for all of the projects and regional centers in the field based on prior work**
- **Act as clearinghouse for educational materials and methods**
- **Form partnerships with two-year colleges, four year colleges and universities, high schools, industries, government and professional societies**
- **Evaluate the effectiveness of their activities**

ATE Resource Centers



- **Constitute a highly visible source of educational materials, ideas, contacts, and mentoring in a particular field of technological education**
- **Led by those who have already made substantial, high-quality contributions in an area of technological education**
- **Serve as clearinghouses for, and broadly distribute, the exemplary materials, curricula, and pedagogical practices adapted or designed by previously funded ATE centers and projects**
- **Provide support and mentoring for institutions that wish to start or improve educational programs in a particular field of technology**

Bio-Link



- **www.bio-link.org**
- **Established as a National in 1998, became a Resource Center in 2005, re-established as National Center in 2009 as a result of a national meeting on biotechnology**
- **Coordinates regional centers in Washington, Texas, Wisconsin, North Carolina and Pennsylvania that emphasize different aspects of biotechnology**
- **Works with centers funded by the Department of Labor**

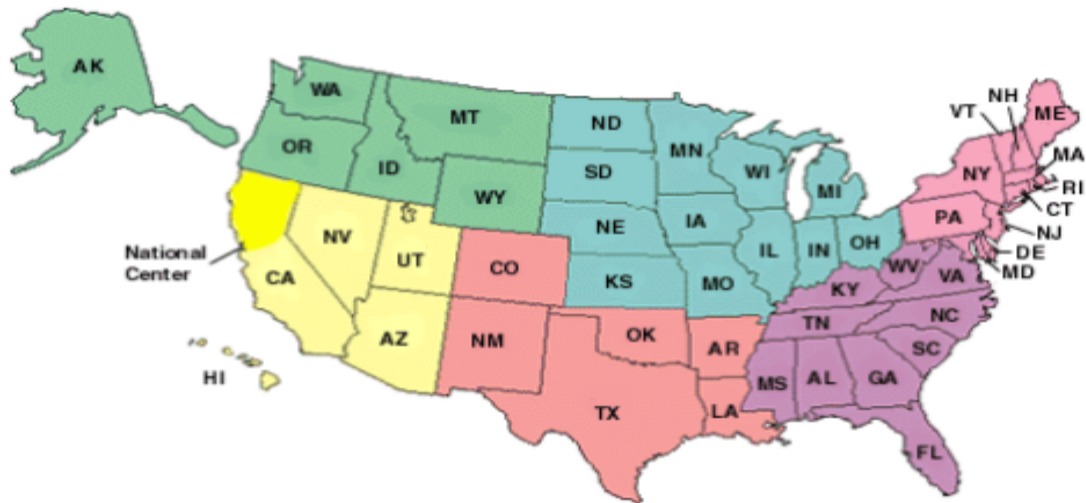
Bio-Link



- **Provides professional development, improves curriculum, creates a system that promotes sharing of information**
- **Educates instructors and principal investigators of other projects and centers**
- **Established close relations with local and national biotechnology industries, other two- year colleges, four-year colleges and universities and high schools**

Biotechnology Education, Organizations, and Industry

Click on the Map for extended view of biotech in your region!



Bio-Link Centers



Regional Centers

Regional focus – serves the needs of industry in a region

- **Collaboration among colleges and secondary schools**
- **Activities include curriculum adaptation, faculty and teacher development, establishment of partnerships, and recruitment and retention strategies, all directed toward regional workforce needs**
- **Clear, measurable impacts on quantity and quality of students for the workforce**
- **Sustained partnership with regional industry after funding ends**



Northeast Biomanufacturing Center

- www.biomanufacturing.org
- Builds and sustains local and regional partnerships among industry, educational institutions and government to create sustainable learning communities around biomanufacturing and educate and sustain a qualified workforce in use of bio-production methods
- 22 industry partners, and 14 educational partners from 10 states

Northeast Biomanufacturing Center



- **Enhance the use of the Biomanufacturing curriculum based on industry skill standards**
- **Provide professional development opportunities**
- **Disseminate information about biomanufacturing education and jobs**
- **Plan for sustainability**

Projects

www.ateprojectimpact.org

Projects can focus on one or more aspects of:

- **Program Improvement;**
- **Professional Development for Educators;**
- **Curriculum and Educational Materials Development;**
- **Teacher Preparation**
(http://www.aacc.nche.edu/Resources/aaccprograms/ate/Documents/teacherprep_stem.pdf)
- **Research on Technician Education; or**
- **Institution-Level Reform of Technician Education**



SLCC Contract Research Organization for Biotechnology



- **Provides working internships for college and high school students where students can translate concepts and techniques from the classroom to a working environment**
- **Uses research projects from companies where companies provide consumable costs and in return have access to a highly trained workforce to offset personnel costs**
- **Helps to meet the demand for a challenging next step for high school seniors and more flexible college internships**

Working with Industry

- **Focus on the competencies that industry requires of technicians**
- **Get decision makers from industry involved**
- **Provide flexible pathways for students**
- **Help industry see that two-year colleges can educate their workers (CAPT, NWCET)**
- **T-shaped technicians - depth in one area but broad understanding of job.**



Project Evaluation

- **Almost all projects have an evaluator – usually external. The project should make a few claims about its effectiveness; the evaluator should provide evidence for the extent to which the claims are justified.**
- **Annual Report of activities and findings**
- **Annual Principal Investigator’s meeting**
- **Kirkpatrick Model for Evaluation of Workshops**
- **Site Visits**
- **Visiting Committees**



ATE Impact: Annual Survey



- **Western Michigan Evaluation Center**
- **Mainly monitoring; Over 95% completion**
- **60,000 students – 25 % Female; 45% minority**
- **46,000 faculty 30% secondary**
- **900 articulation agreements with secondary schools and 550 with four year schools**
- **Develop or modify 450 courses per year**
- **Partnerships with 4900 businesses and industries, public institutions, and other educational institutions provides intellectual contributions and an additional \$20 million in monitory support**

Technical Competency

- **Link companies and colleges in education of technicians**
- **Backward Design**
 - **Establish learning goal**
 - **What will students know and be able to do**
 - **assessment**
 - **Then, and only then, develop activities**
- **DACUMS - Developing a Curriculum – with technicians in industry**
- **Validation by industry**



21st Century Skills



- **Work in teams**
- **Communications – oral and written**
- **Non-routine problem solving**
- **Adaptability**
- **Entrepreneurial – sees what needs to be done and does it as well as understanding business**

**At least as important as technical skills.
Industry cannot teach these skills.**

Problem Based Learning

- **Industry non-mission critical problem about which you build a course or part of a course; a solved problem is a case**
- **Brings the workplace into the classroom**
- **Teaches 21st century skills**
- **Not typical instruction – hard for faculty**
- **Not traditional learning – hard for students**



Other Approaches



- **Cohort groups (SC ATE)**
 - **Must pass all three courses – communications, technical content, mathematics**
 - **High retention and success in future courses**
- **Bridge Programs**
- **Placement tests given in second year of high schools**
- **Internships**

Build Community



- **Project Leaders Meetings**
 - Talks about issues
 - Plenty of time to network
- **Business Advisory Councils**
- **Articulation Agreements**
 - Between high schools and two-year colleges
 - Between two-year and four-year colleges

Impacts on Students



- **Understand the workplace**
- **Broader base of applicable fundamental skills**
- **Correlate courses with DACUM input, industry advice and traditional science standards**
- **Courses address national skill standards**
- **Contacts with industry**

Impact on Faculty



- **Work with curriculum teams to improve correlation of course content to workplace skill and knowledge needs**
- **Think of their job as more than teaching**
- **Serve on local, regional and national committees**
- **Contacts with industry**
- **Network nationally with people with similar interests**

Impact on the Community College

- **Services for grant writing and processing**
- **Connections between colleges**
- **Connections to high schools**
- **Connections to four year institutions**
- **Partnerships with industry**
- **Attention from state agencies**
- **Attention from area professional societies**
- **Attracts other grants and funding**
- **Regional Reputation**



Impact on the Community

- **Economic development**
- **Industrial expansion**
- **Reputation of school**
- **Archived resources**
- **Networks of colleges**



Resources

- www.nsf.gov/ate
- www.atecentral.net
- www.atecenters.org
- www.ateprojectimpact.org
- www.teachingtechnicians.org
- www.evaluate-ate.org



Thank you

Contact information

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Kirkpatrick Model for Evaluation of Workshops

- **Survey participants at workshop**
- **Later probe what they learned**
- **Later probe what they are using**
- **Later probe what has been institutionalized**



ATE Impact: 2008 Survey at a Glance

Students

➤ Gender

N=60,000

- Male 77%
- Female 23%

➤ Ethnicity

- White (non-Hispanic) 37%
- Hispanic/Latino 30%
- African American 16%
- Asian 8%
- Multiracial 5%



ATE Impact: 2008 Survey at a Glance

- **Articulation Agreements – Enable Students to Easily Move from One Level of Education to the Next**
 - **920 Between High Schools and Two-Year Colleges**
 - **560 Between Two-Year Colleges and Four-Year Colleges and Universities**



ATE Impact: 2008 Survey at a Glance

- **Major Emphasis Program Development – 33%**
 - 438 programs being changed
 - 988 courses changes
- **Major Emphasis Professional Development – 44% N= 46,000**
 - 30% secondary school teachers
 - 42% associate degree faculty



ATE Impact: 2008 Survey at a Glance

- **Major Emphasis Materials Development – 42%**
 - 16% for secondary schools
 - 48% for community colleges
 - 25% for 4-year institutions
 - 11% for business and industry
- **Partnerships**
 - 4900 businesses and industries, public institutions, and other educational institutions
 - Provide an additional \$20 million in monetary support

