

**ADVANCED TECHNOLOGICAL EDUCATION PROGRAM  
1997 AWARDS AND ACTIVITIES**

**A** DVANCED  
**T** ECHNOLOGICAL  
**E** DUCATION

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES  
Division of Undergraduate Education  
Division of Elementary, Secondary, and Informal Education



**NATIONAL SCIENCE FOUNDATION**

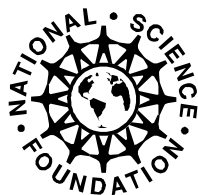
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Division of Undergraduate Education  
Division of Elementary, Secondary, and Informal Education

## THE ADVANCED TECHNOLOGICAL EDUCATION (ATE) PROGRAM Fiscal Year 1997

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NATIONAL SCIENCE FOUNDATION  
ADVANCED TECHNOLOGICAL EDUCATION (ATE)

The Advanced Technological Education (ATE) Program promotes exemplary improvement in technician education at the national and regional levels by supporting—particularly in two-year colleges and secondary schools—the design and implementation of new curricula, courses, laboratories, instructional materials, opportunities for faculty and teacher development, academic support for students, and formal cooperative arrangements among educational institutions and partners from business, industry, and government. Managed jointly by the Division of Undergraduate Education (DUE) and the Division of Elementary, Secondary, and Informal Education (ESIE), the program supports education in a broad range of technological fields, including (but not limited to) biotechnology, chemical technology, computer and information technology, electronics, environmental technology, geographic information systems, manufacturing, and telecommunications.

ATE awards are made for *centers of excellence* and for *projects*. Both categories of award are described below. The program made its first awards in the summer of 1994. At the end of FY1997, the program is supporting 10 centers and over 120 projects. These grantees (including continuing awards from previous years, those cofunded by other NSF programs, and new awards) represent 35 states and the District of Columbia. In FY1997, the program's budget was \$27.4 million. It has increased to \$31 million for FY1998.

**ATE centers of excellence** focus on systemic approaches to technician education, usually within a specific discipline; however, they are also expected to have a broad impact on two-year colleges, secondary schools, the region, and the nation. Centers assure that students acquire strong backgrounds in science, mathematics, and technology; prepare students for high-performance workplaces that utilize advanced technologies; provide a solid foundation for continued education; enhance the disciplinary knowledge and instructional skills of faculty and teachers; serve as models for active partnerships with business and industry; and disseminate nationally usable educational products. Centers generally exhibit the following strengths:

- In both technical and core courses, faculty and teachers are committed to developing expertise in current practices in the relevant disciplines; to applying science, mathematics, engineering, and technology (SMET) principles; to incorporating new technologies and courseware; and to adopting new content and pedagogical strategies.
- Students develop a broad base of core competencies that will allow them to constantly learn and adapt to the changing workplace. Opportunities for direct, hands-on experience allow students to see how knowledge operates in the workplace and how teams, rather than individuals, are jointly responsible for efficient and effective practices.
- Working in conjunction with secondary schools, centers generate interest among students in advanced technological careers, attract students into basic science, mathematics, and technology courses, and ensure that they succeed in those courses and achieve SCANS (Secretary's Commission on Achieving Necessary Skills) competencies.
- Centers bring two-year colleges together with four-year colleges and universities. These collaborations maintain the quality and content of core subjects, promote an emphasis on education instead of short-term training, validate the quality of programs for parents and students, ensure that students are not placed in dead-end academic or career tracks, and give students the flexibility to enter the workplace or to continue on to advanced degrees. In particular, the collaborating educational institutions develop articulation agreements among their programs, and the four-year colleges and universities provide guidance for curricular development and enhancement of faculty at the two-year colleges.

- Centers also cultivate strong partnerships with businesses and industries, professional societies, and state and local governments. Major companies such as Boeing, General Motors, Bell Atlantic, Lucent Technologies, Intel, and Microsoft, as well as numerous smaller firms, have been highly supportive of the ATE Program and have been extremely important in the development of centers and in the dissemination of their curricula. Centers work with industry groups to develop skill standards, which guide program development for both entry-level technical positions and advancement along a career ladder. The collaborations generate up-to-date curriculum materials that meet industry's needs, and they also promote articulation between technician education programs at the high school, two-year college, and four-year college levels. Increasing investments in ATE centers by corporate supporters are generating tangible returns to individuals, companies, and states by producing workers with the proper skills and education to compete in the new global economy.
- Centers provide a focal point for ATE projects in a particular field.

In FY1997, the ATE Program funded two new centers of excellence. *The Marine Advanced Technology Education (MATE) Center* (Monterey, California) is designing and implementing a national program for marine technology education. The center's primary objectives include developing skill standards and curriculum materials for specific marine technician job categories and acting as a clearinghouse for these and other relevant educational materials. *The Northeast Center for Telecommunications Technology* (Springfield, Massachusetts) is a collaborative effort of Springfield Technical Community College with numerous secondary schools, Bell Atlantic and other companies, government agencies, and the New England Board of Higher Education. By developing model curricula in conjunction with industrial partners and preparing faculty and teachers, this center is meeting a significant national need for education in microwave/millimeterwave, wireless/radiofrequency, lightwave, and networking technologies.

**ATE projects** focus on one or more specific aspects of technician education, such as curriculum or instructional materials development, faculty or teacher preparation or enhancement, technical experiences for students, or laboratory development. Science-related technologies are emphasized by 51 projects, including 18 new projects funded in FY1997; engineering and computer technologies are the focus of 46 projects, including 14 new ones; and core curriculum is developed in the remaining 26 projects, 6 of which are new. "Special projects" also continue to be supported through the ATE Program. Several awards can briefly illustrate project activities in each of these areas:

- *Science-related technologies:* (1) *Hawkeye Community College* (Waterloo, Iowa) is validating and implementing an associate of applied science degree in precision agriculture with community colleges, K-12 schools, and universities. (2) *Northwest Indian College* (Bellingham, Washington) is using methods that support Native American learning styles to develop and test an environmental technology program aimed at increasing the number of Native Americans working in tribal natural resource and environmental management programs. (3) *Cold Spring Harbor Laboratory* (Cold Spring Harbor, New York) is developing and disseminating units in biotechnology that prepare high school and community college students for careers in applied biology. (4) *The Education Development Center* (Newton, Massachusetts) is creating and revising educational modules that integrate national science education standards with industry-based bioscience skill standards.
- *Engineering and computer technologies:* (1) *Waukesha County Technical College* (Pewaukee, Wisconsin) is developing an applied manufacturing curriculum that provides for the flexible delivery of technical education using technology-supported instructional packages. (2) *Jones County Junior*

*College* (Ellisville, Mississippi) is establishing a statewide educational infrastructure to prepare Mississippi secondary and postsecondary teachers to implement an approved curriculum in computer networking. (3) *The Hillsboro School District* (Hillsboro, Oregon) is cultivating partnerships between high schools, community colleges, and high-tech industries to expand a precollege program that prepares students for associate and baccalaureate degree programs in semiconductor manufacturing and related fields.

- *Core curriculum development:* A number of projects focus on materials and pedagogy that give students the fundamental mathematics and science skills, as well as the SCANS competencies, necessary for succeeding in technical programs. (1) *The American Chemical Society* continues to develop “SciTeKS (Science Technology: Knowledge and Skills),” a series of multidisciplinary modules that prepare high school students to enter postsecondary programs in science-related technologies. (2) *Lane Community College* (Eugene, Oregon) is developing units that teach students advanced skills in using statistics for continuous process improvement and quality control. (3) *Seminole Community College* (Sanford, Florida) is developing an innovative introductory physics curriculum that targets students in technical programs. (4) *Wentworth Institute of Technology* (Boston, Massachusetts) is creating, through the joint efforts of mathematics and technical faculty, laboratory investigations using engineering laboratories and multimedia simulations to teach mathematical concepts.
- “*Special projects*”: (1) *The City Colleges of Chicago* hosted a national conference to foster partnerships between urban community colleges and industry, in order to prepare students in urban communities to enter and succeed in the workforce. (2) *Phi Theta Kappa*, the honor society for community colleges, is conducting a faculty enhancement and curriculum development project involving 17 community colleges, in order to strengthen SMET education in two-year colleges through the replication of six ATE model projects. (3) *The University of New Hampshire* sponsored a workshop to investigate critical issues in the education of agricultural technicians. (A similar conference on marine technology education led to the creation of the aforementioned MATE Center.) (4) *Bronx Community College* (Bronx, New York) is analyzing mathematics-oriented ATE projects to put together a vision of effective, appropriate mathematics education for students in vocational and technical programs.

Cooperative efforts among ATE centers and projects ensure that the ATE Program is having a national impact. NSF acts as a partner in these efforts by holding annual meetings for principal investigators (PIs) and by supporting other activities that encourage communication among grantees. The theme of the FY1997 meeting for ATE PIs, held in November 1996, was “Two-year College–Business Partnerships,” and about 60 business partners attended along with the PIs. The theme of the FY1998 meeting, held in November 1997, was “Two-Year College–Secondary School Partnerships.” NSF worked with the American Association of Community Colleges (AACC) to sponsor these meetings.

Information about the ATE Program can also be found on the Division of Undergraduate Education’s World Wide Web site at <<http://www.ehr.nsf.gov/EHR/DUE/start.htm>>. For additional information, direct inquiries to:

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# CENTERS OF EXCELLENCE

## New Awards (1997)

### The Northeast Center for Telecommunications Technology

**DUE 9751990**  
FY1997, \$1,000,000  
FY1998, \$1,000,000  
FY1999, \$1,000,000  
*Telecommunications*

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With the unprecedented technological advances experienced in the telecommunications industry over the past decade, the challenge to provide that industry with adequately trained workers is crucial if American industry is to maintain its competitive edge in the increasingly competitive global marketplace. The ultimate goals of the Northeast Center for Telecommunications Technology are aimed at increasing the number of trained persons equipped to ensure such a competitive posture. This will be done by monitoring trends, developing and disseminating relevant curricula and materials, exploring and promoting the best educational methods, ensuring the continuing competence of faculty who teach in telecommunications programs, and recruiting and educating a diverse student population (including nontraditional workers). By developing model curricula in conjunction with partners from the telecommunications industry, the project will serve as a national model.

The center's curricula will target the faculty and students at secondary schools, two-year colleges, and universities and will employ both traditional and newly emerging teaching methods (such as virtual classrooms and laboratories). The curricula will also articulate with Bachelor of Science in Engineering Technology degree programs at four regional universities, as well as the Bell Atlantic "Next Step" Program. Following evaluation of the project, its outcomes will be disseminated nationally.

In the center's activities, Springfield Technical Community College and Hudson Valley Community College (Troy, NY) will lead a consortium of a dozen community and technical colleges, six senior institutions, numerous secondary schools, several partners from business and industry, several government agencies, and the New England Board of Higher Education.

### MATE: Marine Advanced Technology Education Center

**DUE 9752028**  
FY1997, \$999,194  
FY1998, \$998,079  
FY1999, \$999,973  
*Marine Technology*

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This center will coordinate the development of a modern, national program for marine technology education involving high schools, community colleges, technical schools, and four-year colleges. Focusing on program development at community colleges, the center will emphasize intensive interaction between educational institutions and industrial, military, government, and labor organizations.

Goals of the center include (1) development of a national consortium of institutions and organizations having a major interest in marine technology education; (2) assessment of skill requirements and development of national standards for specific marine technician job categories, which will lead to standardized certificates and degree programs; (3) creation and distribution of new curricula; (4) development of an accreditation mechanism for educational programs in marine technology; (5) creation of a directory covering existing marine technology education programs and their strategies for articulation with programs at other educational levels; (6) development of models for student recruitment and retention; (7) provision of summer institutes and internships in marine technology for students, faculty, and technicians; (8) publication of newsletters and creation of a clearinghouse to disseminate curricula and information on certificate and degree programs, faculty development opportunities, and technician job placement; and (9) development of ongoing funding and in-kind support to sustain the center beyond the period of NSF funding.



## CENTERS OF EXCELLENCE

### Renewed Awards (1997)

The three ATE centers listed below were established in 1994 and are now being funded for a second three-year term. In addition to these centers and the two new ones established in 1997, five centers that were established in 1995 and 1996 have awards that continue in 1997: the Maricopa Advanced Technology Education Center (Tempe, AZ); the New Jersey Center for Advanced Technological Education (Edison, NJ); the NorthWest Center for Emerging Technologies (Bellevue, WA); the Northwest Center for Sustainable Resources (Salem, OR); and the South Carolina Advanced Technological Education Center (Columbia, SC). (See the map on page 35.)

#### **National Center of Excellence for Advanced Manufacturing Education**

**DUE 9714424**  
FY1997, \$813,608  
FY1998, \$691,100  
FY1999, \$495,292  
*Manufacturing*

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Center  
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Dayton, OH 45402

This award to Sinclair Community College provides renewed funding for the National Center of Excellence for Advanced Manufacturing Education (NCE/AME), which was originally established under DUE 9454571.

NCE/AME is operated by the Advanced Integrated Manufacturing Center, a partnership between Sinclair Community College and the University of Dayton. NCE/AME's partners include educational institutions throughout the United States, the Miami Valley Tech Prep Consortium, other secondary school systems, manufacturing companies of all sizes, the Society of Manufacturing Engineers and other professional associations, and local, state, and federal government agencies.

The center encourages strong customer-supplier relationships between manufacturers and educators. It is developing interdisciplinary curriculum materials leading to an associate's degree in manufacturing engineering technology and is providing substantial opportunities for faculty development to educators involved in manufacturing-related fields.

The center employs a competency-based, occupationally verified approach to curriculum development, which ensures that students can acquire the knowledge and ability to become quick contributors to the companies that employ them. The curriculum materials emphasize hands-on problem-solving, enabling students to build a strong foundation of analytical skills required for lifelong learning and technical growth.

The center's faculty development workshops expose high school, community college, and university educators to the technical, analytical, and interpersonal skills that are required in manufacturing environments today and give those educators tools for integrating those skills into the classroom.

#### **Advanced Technology Environmental Education Center**

**DUE 9714425**  
FY1997, \$840,743  
FY1998, \$673,676  
FY1999, \$485,581  
*Environmental Technology*

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This award to the Hazardous Materials Training and Research Institute (Cedar Rapids, IA) provides renewed funding for the Advanced Technology Environmental Education Center (ATEEC), which was originally established under DUE 9454638.

*Environmental technology* has been defined as "a career field that utilizes the principles of science, engineering, communication, and economics to protect and enhance safety, health, and natural resources." This field encompasses an array of professions—including pollution prevention, water and wastewater treatment, and energy and conservation—and an array of disciplines—including mathematics, science, sociology, political science, technology, and economics—as well.

ATEEC's mission is to advance environmental technology education through curriculum development, professional development, and program improvement in the nation's community colleges and secondary schools. The center's vision is to create a national network of community colleges, supported through public and private partnerships,

that prepares and maintains an environmental technology workforce to address industry's needs and to promote the transfer of secondary students to higher education.

To build an environmental technology education infrastructure, ATEEC has utilized the strengths of its partners, the Hazardous Materials Training and Research Institute, the Partnership for Environmental Technology Education, and the University of Northern Iowa's Center for Environmental and Energy Education. To date, more than 40 activities have been completed successfully and have substantiated ATEEC as a national focal point to lead efforts in program development and improvement in environmental technology education.

### **Southwest Center for Advanced Technological Education**

**DUE 9714435**

FY1997, \$624,100

FY1998, \$548,303

FY1999, \$81,294

*Multidisciplinary*

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Texas State Technical College                      (915) 235-7370  
at Sweetwater  
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Sweetwater, TX 79556

This award provides renewed funding for the Southwest Center for Advanced Technological Education (SCATE), which was originally established under DUE 9454643.

SCATE was founded to experiment with and demonstrate how advanced technological education can be delivered over distance learning systems. In its first three years, the center focused on the development of a distance learning infrastructure, the professional development of faculty, and the revision of curriculum materials for delivery through distance education. Now the center is focusing on the development and testing of technical courses that require a hands-on laboratory component. Some of these courses are being developed in conjunction with the Maricopa Advanced Technology Education Center and the NorthWest Center for Emerging Technologies; others are being developed for use at industrial sites. An A.A.S. degree program for distance learning technicians is also being developed. The center is increasing its role in the professional development of faculty and in representing the infrastructure needs of the technical education community in distance learning networks.

# PROJECTS

## New Awards (1997)

Several ATE projects listed below are being co-funded by other NSF programs. For those cases, the ATE contribution is listed first, and the total award from all NSF sources is given in parentheses.

### **Integrated Natural Resources Technology Program**

**DUE 9751983**

FY1997, \$169,158

*Natural Resources Technology*

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This program—a two-year, high-tech technician curriculum with a three-year option for students transferring to four-year institutions—will demonstrate an interdisciplinary approach to educating technically advanced field technicians for ecosystem-based management. In contrast to traditional natural resources (and related) programs that focus on individual disciplines such as forestry, fisheries, or wildlife, the Integrated Natural Resources Technology Program will embody a systems perspective toward information gathering, data analysis, and ecosystem management.

In building this program, project participants will (1) develop, implement, evaluate, and disseminate an outcome-driven curriculum; (2) develop and implement a summer institute to assist community college faculty in adopting an integrated perspective; and (3) develop and implement integrated field experiences for students. These activities will be based on a framework of prior work by the project coordinators, who have already identified skills to be acquired by students, conducted an employability survey to ensure that these skills meet employers' needs and that jobs are available, developed a curriculum framework, and established agreements to collaborate with employers in developing cooperative work experiences for students.

The program has strong support from local public and private employers in natural resources, as well as from education; it will articulate with natural resources programs at three universities and two high schools.

### **Advanced Technological Education in Plastics Engineering Technology**

**DUE 9751984**

FY1997, \$600,735

*Plastics Engineering*

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The plastics manufacturing industry has grown at the rate of about 10% per year for each of the last 25 years and now has approximately 250,000 technician-level jobs. Until about 10 years ago most of these were blue collar jobs, requiring little or no technical training. Innovations in processing technology have changed this situation dramatically, and there is now a pressing need for technicians and engineers with two- and four-year degrees. There are very few two-year institutions with plastics technology programs, and only one, Penn College, is TAC/ABET-accredited. The institutions that do have programs (or often just one or two courses) are limited by the absence of instructional materials aimed specifically at technician training.

The objective of this project is to tackle these problems by developing curricular and instructional materials and providing opportunities for faculty development at two-year institutions. To accomplish these goals, a consortium has been established between Penn College (a predominantly two-year institution), Penn State, the University of Massachusetts at Lowell, and a number of industrial partners. The project will establish a "modular" educational approach that emphasizes hands-on training and allows students to progress from high school to two-year and four-year programs. A special effort will be made to reach students from under-represented groups.

**An Alliance to Prepare Technicians for Careers in  
Advanced Manufacturing and  
Engineering Materials Technology**

**DUE 9751987**

FY1997, \$66,900

*Materials Science and Manufacturing*

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This project aims to develop student recruitment and retention techniques, instructional strategies, educational materials, and laboratory activities for precollege and college programs related to manufacturing and engineering materials technology. The project will involve a dynamic alliance among community colleges, public schools, and a university, coupled with business, industry, government, and technical societies. Building on the vast experience of the project team from Norfolk State University, Tidewater Community College, and the Virginia Beach Public Schools, the alliance will synthesize a coherent "2+2+2" model program that moves students into and through the educational pipeline for careers as advanced industrial/engineering technicians.

The project team will select and develop appropriate materials for both precollege- and college-level technician programs. At the precollege level, the main emphasis will be on using materials science and technology to integrate math, science, and technology concepts. A further emphasis will be on interfacing computers with materials testing equipment. In addition, the team will develop strategies and materials aimed at informing guidance counselors, students, and parents about career opportunities for technicians in materials science and manufacturing. At the A.A.S. and B.S. levels, the team will select from available materials and develop multimedia units related to engineering materials technology and manufacturing.

During each year of the project, a National Educator's Workshop on engineering materials technology will provide technical updating to 10 community college faculty members.

**Preserving the Legacy:  
A Comprehensive Curriculum and Materials  
Development Project in Support of Advanced  
Environmental Technology Education**

**DUE 9751988**

FY1997, \$487,873

FY1998, \$498,127

*Environmental Technology*

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*Preserving the Legacy* is a series of textbooks and videos being produced by a collaboration between INTELECOM Intelligent Telecommunications, the Partnership for Environmental Technology Education, and Van Nostrand Reinhold Publishers. These materials respond to a pressing need for high-quality, professional-level instructional materials for training two-year community and technical college students, as well as secondary school students, university students, and corporate and government employees. The curriculum is designed for flexible use in a wide variety of curricular programs. For example, educational institutions can incorporate *Preserving the Legacy* within distance learning programs that link instructors and students through telecommunications, and others can integrate the materials into training programs for business and industry.

When *Preserving the Legacy* is complete, textbooks and videos will be available nationally and internationally to present the basics of environmental technology, not only to inform and train students but also to inspire them.

**Chemical Technology Education Collaborative  
(ChemTEC): Advanced Technological  
Education Project**

**DUE 9751993**

FY1997, \$425,720

FY1998, \$400,000

*Chemical Technology*

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This project will build on the solidly established Partnership for the Advancement of Chemical Technology (PACT) consortium (funded under DUE 9454518) and the nationally recognized Partners for Terrific Science industrial-academic coalition. Through collaboration among these interested

institutions and organizations, the ChemTEC project has six goals: (1) to advance the professional interests of chemical technicians and chemical technology educators; (2) to strengthen and expand existing collaborations involved in chemical technology education; (3) to provide chemical technology educators with conceptual knowledge, pedagogical tools, time, resources, and professional support; (4) to collaborate with industry to keep educators abreast of the latest technological developments; (5) to develop, publish, and distribute content-rich, pedagogically sound curricular materials; and (6) to develop curricular materials for the secondary school level that engage students in laboratory-driven challenges.

ChemTEC will address the above goals through six areas of activity: "Networking to Build a Community of Practice," the "Research Profile Project," "Curricular Materials for Chemical and Related Technology Education," "Professional Development Opportunities for Educators," "Student Programming," and "Dissemination and Outreach."

#### **Assignment: Chemical Technology**

**DUE 9751998**

FY1997, \$205,531

FY1998, \$192,948

*Chemical Technology*

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This project, entitled "Assignment: Chemical Technology—II," or ACT-II, will continue work begun in 1995 in the NSF-supported project "Assignment: Chemical Technology—I," or ACT-I (DUE 9553674).

Southeast Community College (SCC), in partnership with the University of Nebraska, the DuPont Company, 36 other community colleges across the country, 7 industry representatives, and an advisory board, is continuing to spearhead efforts to reform the curriculum and materials for chemical technology education programs in community colleges. ACT-I targeted the curriculum and student materials for the first-year chemistry course in these programs. The ACT-II project targets three major areas: (1) the laboratory program for the first-year chemistry course, (2) the analytical chemistry and organic/biochemistry courses, including laboratories, found in the second year of these programs, and (3) multimedia materials, including World Wide Web supplements and CD-ROM materials, to complete the work already begun for the first-year course and also to address the second-year courses.

The curriculum and materials under development are being guided in part by the Voluntary Industry Skill Standards for the chemical process and bioscience industries,

good laboratory and management practices (GLP and GMP), and safety and occupational health issues.

#### **Advanced Technology Education Program in Manufacturing Information Systems**

**DUE 9752004**

FY1997, \$199,944

*Information Technology*

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This project will create and deliver curricula that enable students from diverse educational backgrounds to enter either the workforce or a community college program in manufacturing information systems engineering. The project has four components: (1) development of curricula and instructional materials, (2) articulation with other programs, (3) faculty development, and (4) an industry internship program for students.

The manufacturing information systems program will emphasize system integration and seamless transitions among curricula. The curricula will lead first to a Certificate in Information Technology (CIT) at the high school level, and then to an Associate of Science degree in Manufacturing Information Systems Technology (MIST) at the community college level. Both curricula will lead seamlessly into an existing Bachelor of Science in Engineering degree program in Manufacturing Information Systems Engineering (MISE). A certificate of Technical Preparation in Information Technology (TPIT) for working technicians will also be developed. These curricula will be designed and delivered by an alliance of high schools, community colleges, a four-year university, and several high-tech companies in the Silicon Valley.

Participating companies will play an active role in designing curricula, developing case studies, providing internships and training for both students and faculty, making available state-of-the-art laboratory equipment, organizing industry-based team projects, and committing matching funds.

Products of the project (curricula, laboratory manuals, other instructional materials, and results of cooperative learning workshops for faculty) will be disseminated nationally through publications, annual workshops, and the Internet.

## Study of Present and Future Skill Levels of Visualization Technicians

**DUE 9752014**

FY1997, \$96,959

*Visualization Technology*

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Northern Alabama is identified as a high-technology area, having a large number of businesses, industries, and government agencies that need technicians educated at the two-year college level with skills in visualization technology, virtual reality programming, and multimedia applications. In this project, government agencies, businesses, and industries will be contacted to identify the common core of skills needed by visualization technicians and to assess future trends in the skills needed. Two-year colleges will be contacted to determine what level of education is being offered and to share curricula. Information will also be gathered at various conferences on visualization and related topics. A Web page will present the collected information, which will be used to establish skill standards and curricula for community colleges educating visualization technicians.

## Undergraduate Faculty Enhancement in Science, Mathematics, and Engineering Technology

**DUE 9752015**

FY1997, \$100,000

*Industrial Technology*

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This project will be a cooperative effort between Sinclair Community College, General Motors Delphi Chassis (a leading manufacturer of automotive and light truck chassis, in Dayton, OH), KMC Controls (a leading manufacturer of process control equipment, in New Paris, IN), and Stratasys (a leading manufacturer of rapid prototyping systems, in Eden Prairie, MN). During the summers of 1998 and 1999, these four collaborators will sponsor a series of one-week, comprehensive professional development programs for two-year college engineering technology, science, and mathematics faculty. Offerings will include (1) a rapid prototyping course at Sinclair Community College at the Advanced Integrated Manufacturing Center (Dayton, OH), in cooperation with Stratasys; (2) a workcell simulation

course at Sinclair Community College at the Advanced Integrated Manufacturing Center, in cooperation with General Motors Delphi Chassis; and (3) a process control course at KMC Controls. Participating faculty will attend the courses and work hand-in-hand with their colleagues from industry and universities while learning about the latest technology in the areas represented by the courses.

The project will target 20 engineering technology, science, and mathematics faculty each year (a total of 40 people) from two-year colleges across the country.

## Water on the Web: Monitoring Minnesota's Lakes on the Internet

**DUE 9752017**

FY1997, \$301,840

FY1998, \$200,000

FY1999, \$154,736

*Environmental Science*

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Increased pressure on natural resources worldwide and shrinking budgets are causing environmental management organizations to rely increasingly on advanced technology. There is a clear need for the training of highly skilled, multidisciplinary environmental professionals, who will be able to utilize advanced technology to achieve environmental management goals.

The purpose of this project is to contribute to a more scientifically and technologically competent workforce through a comprehensive educational program for high school and community college students and teachers. This goal will be achieved by developing curriculum modules that teach basic science concepts illustrated through the use of real-time remote sensing technology, geographic information systems, and the Internet. Multidisciplinary teams of academic, science, and technology specialists (including representatives from universities, community and tribal colleges, secondary schools, natural resource and research agencies, and industry) will cooperatively develop this curriculum. In this project, students will conduct interactive inquiries of widespread environmental systems using newly developed, real-time, remote sampling technology linked with classrooms through cellular communication and the Internet, and they will also participate in industry-sponsored internships.

Final curricula will be disseminated through printed materials, an interactive CD-ROM distributed through the National Sea Grant network, materials available on the Internet, in-service training workshops, presentations at professional conferences, and finally, a national conference on

the use of real-time data and emerging technologies in undergraduate science education.

### **Reinventing Computer-Aided Drafting and Design in a Total Modeling Environment**

**DUE 9752021**  
FY1997, \$300,000  
FY1998, \$150,000  
FY1999, \$150,000

*Computer-Aided Drafting and Design*

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This project will revise the curriculum in drafting and design in order to ensure that community colleges can educate students to current and projected industry standards.

An in-depth study of the design process in a 3-D modeling environment and of the new package of skills that this process demands will culminate in the creation and piloting of a new curriculum, which will include rapid prototyping and CNC machining. The resulting curriculum manual will be disseminated nationally. To insure the successful implementation of the curriculum, the project will sponsor workshops and internship opportunities for faculty.

### **Southeast Michigan Alliance for Reinvestment in Technological Education (SMARTE): Advanced Technologies in Product Design**

**DUE 9752024**  
FY1997, \$450,000  
*Product Design*

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Division of Engineering Technology  
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SMARTE is a consortium of five community colleges, Wayne State University, K-12 school systems, community-based organizations, government agencies, and labor, business, and industry interests in southeastern Michigan. Its activities have been funded previously under DUE 9553692.

The overall goal in the current phase of the SMARTE project is to assist community colleges, school districts, and universities to prepare skilled technicians in product design by offering programs and delivery systems that are partnered with business and industry. The major initiatives are (1) to develop regional product design curricula based upon skill standards, mathematics and science applications, information technologies, and work-based learning and (2) to

develop programs and delivery systems for the recruitment, retention, and placement of nontraditional students in learning communities. To accomplish these initiatives, SMARTE will (1) develop or enhance regional product design programs, using the industry standards and criteria (SCANS, ABET, NAIT, Advanced Manufacturing) which were established during the first phase of the SMARTE project and which resulted in core competencies for product design; (2) implement work-based learning experiences as part of technical programs; (3) integrate information technologies into instructional delivery; (4) develop simulation programs that incorporate skills needed by the advanced manufacturing industry; (5) conduct enrichment programs for students to increase competencies in math, science, computers, and product design; (6) develop and deliver an enrichment program for middle school teachers in product design; (7) work with college faculty and K-12 teachers to share training resources on technological skills, core competencies, and recruitment and retention programs for nontraditional students.

### **Engineering Prep: A Model School-To-Work Curriculum to Support ATE Programs in Semiconductor Manufacturing**

**DUE 9752025**  
FY1997, \$205,224  
*Semiconductor Manufacturing*

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The Hillsboro School District, in partnership with Portland Community College, has developed an excellent precollege program called "Engineering Prep," which can serve as an effective precursor to ATE programs in semiconductor manufacturing. This project will support replication of the Engineering Prep program locally and nationally through the publication of curriculum materials, faculty enhancement workshops to equip high school teachers and community college faculty to implement the curriculum, and follow-up consultancies for each implementation site.

Products to be disseminated include a curriculum guide and classroom-ready instructional materials. These products, combined with the faculty enhancement workshops, will enable quicker implementation of precollege programs supporting associate and baccalaureate degree programs in semiconductor manufacturing and related fields.

**Biotechnology Technicians for the Future:  
Replicating the Wisconsin Model**

**DUE 9752027**  
FY1997, \$360,000  
*Biotechnology*

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Agriscience, Apprenticeship, Technology,  
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This project will expand and disseminate successful activities that were developed and implemented in a previous project funded through the ATE program, "An Advanced Biotechnology Education Partnership Program" (DUE 9454555). The overall goal of the project is the improvement of technical education in biotechnology.

Efforts in the project to date include the development and dissemination of curriculum materials for technician training at the two-year associate degree level; teacher enhancement activities for associate degree instructors and high school teachers; and school-to-work experiences for high school students. Through this new grant, these activities will be significantly enhanced by (1) continuing curriculum development and dissemination, (2) expanding participation geographically through collaboration with other University of Wisconsin system campuses and other technical and community colleges in the state and in the broader Midwestern region, (3) increasing participation by students and faculty at all levels, from middle school through baccalaureate programs, (4) offering opportunities for lifelong learning to technicians already employed, and (5) increasing the participation of qualified women, minorities, and persons with disabilities.

This project represents a collaborative effort among the Biotechnology Laboratory Technician Program at Madison Area Technical College, the University of Wisconsin Teacher Enhancement Program, and the industry-supported BioPharmaceutical Technology Center Institute. This partnership, coupled with the extended network of collaborators being developed through project activities, is poised to effectively meet the challenge of recruiting, training, and providing continuing education for biotechnology technicians—a task that is critical to the continued prosperity of the industry.

**Measure Up! Dimensional Metrology and ISO 9001**

**DUE 9752032**  
FY1997, \$299,900  
*Metrology and Machine Tool Technology*

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This project aims to provide opportunities for lifelong learning to machine tool and metrology technicians so they can develop and maintain skills to meet the needs of industry. To achieve this goal, a partnership consisting of Madison Area Technical College (MATC), the University of Wisconsin Center for Quality and Productivity Improvement, and the Madison Metropolitan School District will collaborate with a network of industry and education representatives who have a stake in highly skilled metrology technicians and qualified teachers.

The project will pursue the following objectives: (1) Establish and maintain active collaborations with representatives from education, business and industry, and government. (2) Incorporate employers' needs, mathematics and science standards, and quality standards into a metrology curriculum for middle school, high school, and undergraduate students, as well as employees. (3) Develop and implement professional development opportunities for faculty and technicians. (4) Adopt and develop strategies to increase the enrollment and success of students, particularly those from underrepresented groups; increase work experiences for students and faculty; enhance the professional status of technician careers; and provide lifelong learning opportunities for technicians. (5) Facilitate the exchange of ideas among students, educators, employees, and employers. (6) Evaluate project implementation through proactive third-party evaluators.

The stakeholders will exchange ideas and collaboratively develop metrology curricula at metrology institutes. They will also develop strategies as prescribed in Objective (4). Finally, they will gain work and hands-on laboratory experience in the MATC Metrology Laboratory and in the proposed Mobile Metrology Laboratory.



## Developing Materials for Industry-Based Education

**DUE 9752036**

FY1997, \$199,978

FY1998, \$99,970

FY1999, \$99,965

*Aviation Technology*

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Two multimedia curriculum packages will be constructed to support curricular initiatives in both secondary schools and community colleges. Each module will permit independent study, encourage collaboration among students, and provide a compendium of resources to assist students in addressing authentic workplace issues.

Over three years, two scenarios—built around the design and maintenance issues raised by the Boeing 777—will be constructed and tested in NSF systemic initiative sites and elsewhere. These materials will lead to strong learning experiences for high school students headed for careers as technicians in workplaces that rely on the use of advanced technologies. The focus will be on careers in aviation and on the mathematics, science, and technology subjects that arise in important and engaging ways within this industry.

National mathematics, science, and technology standards will be incorporated into two “electronic scenarios” that combine video, graphics, gaming, simulation, and text within computer-managed multimedia packages. Products of this grant will include the complete multimedia curriculum packages, a teacher’s guide, and evaluation and dissemination activities.

## A Partnership to Develop Advanced Technology Units on Genomic Biology

**DUE 9752037**

FY1997, \$202,132

FY1998, \$195,979

FY1999, \$201,714

*Biology*

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This project will develop and disseminate advanced technology units on genomic biology, which will further prepare high school and two-year college students to participate in the future of applied biology. The units will integrate strong

science content with practical skills, which will at once encourage students to continue with formal science training and better prepare them for advanced technical vocations. The units will stress fundamental themes of evolutionary similarity and individual variation in genetic information. Modern methods of gene identification and analysis will be illustrated by student experiments with human, insect, and plant DNA polymorphisms (“fingerprints”). Comparative genomics and evolutionary biology will be illustrated by computer manipulations of gene databases; these studies will include online projects using student-generated data as well as data from DNA/protein databases. Students will also have the opportunity to prepare a key enzyme (Taq polymerase) and construct a key laboratory instrument (a DNA thermal cycler). Laboratory experiments with human polymorphisms and database manipulations will lead naturally to discussion of the ethical, legal, and social issues associated with genetic testing.

The project is a partnership between the DNA Learning Center (DNALC) of Cold Spring Harbor Laboratory, The Institute for Genomic Research (TIGR) Science Education Foundation, the Center for Occupational Research and Development (CORD), and high school and two-year college faculty. The curriculum materials will be based on key lab and computer technology developed at the DNALC and the University of Chicago that makes DNA fingerprinting by polymerase chain reaction (PCR) accessible and affordable for student use. The high school unit, focusing on relatively simple human polymorphisms and statistical analyses, will expressly articulate CORD’s nationally used Applications in Biology/Chemistry (ABC) curriculum. The college unit will extend to more ambitious analyses of sequence polymorphisms in mitochondrial DNA, open-ended experiments in conservation and evolutionary biology, and advanced statistics for DNA/protein sequence comparisons between organisms.

## Integrated Mathematics and Physics for Technical Programs

**DUE 9752038**

FY1997, \$119,999

*Applied Mathematics and Physics*

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This grant will support several integrated mathematics and physics projects aimed at (1) strengthening students’ skills in applying mathematical concepts and (2) better preparing students for a highly technical workplace. These classroom projects will use physical concepts to motivate the study of mathematical concepts. The mathematics will be immedi-



will be (1) to discuss the technological challenges facing agricultural technicians; (2) to identify the enhancements in science, mathematics, engineering, and technology education that are required to meet these challenges; (3) to reach consensus on the mission, activities, and governance of a proposed National Agricultural Technician Education Center; and (4) to facilitate networking by those interested in two-year agricultural technician education.

### **Virtual Classroom Environment**

#### **DUE 9752054**

FY1997, \$219,665

FY1998, \$159,008

FY1999, \$172,433

#### *Electronics and Computer Technology*

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Daytona Beach Community College, utilizing faculty and consultants in computer and engineering technology, will create a new instructional environment for introductory classes in electronics, computer-aided design, civil engineering, and computer programming. This new environment will address the various learning modalities and diverse schedules and lifestyles of nontraditional students, who are found in ever-increasing numbers at institutions nationwide. The virtual classroom will permit students to access their courses in computer technology and electronics at any time and from any place via the Internet.

The specific objectives of the project are (1) to develop and implement a virtual classroom environment that allows time- and place-independent access to course materials and provides a teaching-learning interchange for students and faculty; (2) to develop and implement an appropriate interactive curriculum for the virtual classroom; and (3) to provide in-service training for secondary school teachers through tech prep and school-to-work programs focusing on the use and development of interactive computer-aided instruction.

### **Computer Simulations of Industrial Statistical Applications for Undergraduates and Technicians**

#### **DUE 9752058**

FY1997, \$262,800

#### *Applied Statistics*

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This project is aimed at (1) preparing technicians for high-performance workplaces that utilize statistical methods for continuous process improvement and quality control, (2) providing world-of-work contexts for learning statistics for lower-division transfer students and for technicians in training, (3) introducing students to technical fields and workplaces in which statistical methods are applied, and (4) creating new courseware and making it available to other schools and training programs. These goals will be addressed by mathematics faculty in partnership with regional manufacturers, a professional statistician, and a quality control engineer.

Authentic applications will be used to help students understand important statistical concepts and provide them with knowledge of actual work environments. To teach problem solving with statistics and, in particular, statistical process control, the project will develop, pilot, evaluate, and disseminate four multimedia curricular modules, which will feature computer simulations of real-world industrial applications. A version of the modules will be accessible on the World Wide Web, and a final version will be published on CD-ROM. The modules will be appropriate for use in core statistics courses and for courses to upgrade skills of the technical workforce.

### **Network Training for Educators**

#### **DUE 9752060**

FY1997, \$360,330 (total: \$410,330)

FY1998, \$300,742 (total: \$350,742)

FY1999, \$321,050

#### *Information Technology*

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This project will create a statewide infrastructure providing education and training in network technology for faculty at secondary schools and two-year colleges. This infrastructure will, in turn, enable the implementation of a computer network management curriculum for students at two-year

colleges, enable the development of a related curriculum for secondary students, and enable the widespread utilization of computer networks as an instructional tool. Teacher preparation will be a significant element of this program, since many of the participants will be future K-12 teachers. Through the program, they will be well-prepared to introduce and maintain information technology systems in the schools and to use them in their teaching. This project will provide the foundation for a smooth transition from high school to community college in the field of information technology.

The project's specific objectives are (1) to establish an infrastructure for training secondary and postsecondary teachers in local area networks and telecommunications networks; (2) to educate a core of two-year college faculty who will be qualified to implement (statewide) the approved networking curriculum for technical students and to utilize computer networks as instructional tools; (3) to educate a core of secondary school faculty who will be qualified to teach the complementary networking curriculum for secondary students and to manage and utilize computer networks for instructional purposes; and (4) to provide training and resources for using the World Wide Web as a teaching and learning resource.

### **Distance Learning and Virtual Laboratories for Technician Training**

**DUE 9752061**  
 FY1997, \$189,295  
 FY1998, \$205,918  
 FY1999, \$204,787  
*Photonics*

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To meet the demand for highly trained technicians in photonics, an improved classroom and new texts and tutorial materials in laser and fiber optics will be developed and used to train technicians in the Laser and Fiber-Optic Technology Program (LFOT) at Queensborough Community College (QCC) and at other institutions in the region. To better connect the project with the needs of industry, the LFOT advisory board of representatives from local companies will be consulted throughout the development process.

Multimedia courseware, interactive video, online laboratory manuals, remote laboratory access through PC-driven instrumentation, and shared facilities will be used to train technicians at QCC and other institutions. By making the computer-based materials available on CD-ROM, students will have access to them with or without connecting to

the QCC Physics Department network. Students at remote locations (schools other than QCC) will be able to access the QCC network for real-time contact with instructors and laboratories.

The materials developed and tested at QCC will be used for training students through distance learning at Suffolk Community College. This approach will then be expanded to other regional colleges. Regional and national workshops will be used to disseminate the project materials and to encourage the establishment of similar networks of colleges nationally. Student internships will be provided by industrial and research institutions, and their performance will be evaluated as part of an ongoing evaluation of the program.

### **Development of an Advanced Manufacturing Center: A Partnership with Industry to Prepare Technicians for Success in a Global Manufacturing Environment**

**DUE 9752062**  
 FY1997, \$240,000  
*Manufacturing*

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This two-year project will give students hands-on training in advanced manufacturing at the secondary and postsecondary levels and will also link manufacturers to the educational process, in order to create a skilled workforce that can compete in a global manufacturing environment.

Two advanced manufacturing courses will be created to provide hands-on experience with state-of-the-art manufacturing equipment. To address the need for recruiting secondary students into careers in manufacturing technology, the project will also develop a course for high school students that will provide information about manufacturing careers and exposure to design and implementation processes in manufacturing technology. At the middle school level, the project will sponsor a summer camp to provide students with exposure to manufacturing technology and careers in manufacturing.

Professional development experiences will be provided for middle school and high school manufacturing technology teachers, high school guidance counselors, technical college faculty from throughout South Carolina, and manufacturing employees who need to upgrade their skills.

**Native American  
Environmental Technology Program**

**DUE 9752076**

FY1997, \$218,762

FY1998, \$289,972

FY1999, \$266,315

*Environmental Technology*

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In collaboration with three other postsecondary institutions in the Pacific Northwest, Northwest Indian College will develop and test a two-year A.A.S. degree program in Native American environmental technology. This program will meet a critical need among area tribes to increase the number of Native Americans working in tribal natural resource and environmental management programs.

The project will mainly involve developing and pilot-testing a curriculum, sponsoring student internships, and developing articulation agreements with four-year institutions. The methods used will specifically support Native American learning styles and the development of transferable technical skills that can lead to meaningful careers in the area of environmental science and management. These methods will include hands-on learning, an emphasis on developing speaking and writing skills, group projects, multidisciplinary courses, and an internship program. In the third year of the project, the college will host a symposium to formally present findings and work products.

The three regional institutions joining Northwest Indian College in this project—Evergreen State College, and Huxley College and Fairhaven College, both at Western Washington University—have a track record of working effectively to meet educational needs of Native American students and tribal communities. Mesa State College and Navajo Community College will also provide assistance through the results of their ATE grant (DUE 9454633).

**Validation and Implementation of a Coordinated  
Precision Agricultural Curriculum with K–12,  
Community Colleges, Universities, and Industry**

**DUE 9752081**

FY1997, \$300,000

FY1998, \$200,000

FY1999, \$200,000

*Agriculture*

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In a previous project funded by an NSF grant (DUE 9553751), Hawkeye Community College (HCC) developed a two-year Associate of Applied Science degree in agriculture and food technology. Now HCC, along with Kirkwood Community College and Lansing Community College, are validating and implementing a coordinated curriculum in precision agriculture. This curriculum incorporates modules and courses in precision farming, environmental science, and geographic information systems, along with a core of applied mathematics and science courses. It increases the flexibility of the agriculture and food technology curriculum for use by other community colleges in the Midwest.

Five additional Midwestern community colleges are developing certificate programs or integrating the HCC agriculture technology program into their agricultural programs. Each of the participating colleges is forming a linkage with one or more K–12 schools and a university. By expanding the use of the precision agriculture curriculum to K–12 schools, mathematics and science skills will be enhanced. For pre-service and in-service teachers, the project will offer workshops on precision agriculture, as well as conferences to coordinate the articulation of the program between different educational levels. Out of this effort will come a coordinated precision agriculture curriculum that provides a seamless career pathway while stressing mathematics and science skills that are necessary for technologically advanced careers.

**Technical TECH SPAN:  
Fulfilling Lifelong Learning Through a Flexible  
Manufacturing Curriculum**

**DUE 9752082**

FY1997, \$300,000

FY1998, \$200,000

FY1999, \$200,000

*Manufacturing*

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Because of the rapid pace of technological change, business and industry are demanding that training in certain basic technical competencies be made available to the workforce in easily accessible learning formats. The mission of the TECH SPAN project is to develop an applied manufacturing curriculum that provides for the flexible delivery of technical education to first-time and returning students.

The project will create an adaptable manufacturing curriculum in technology-supported instructional packages for use at the undergraduate and secondary school levels. Specifically, TECH SPAN will (1) use the computerized, performance-based Wisconsin Instructional Design System to develop modules and instructional materials addressing 11 technical core competencies in manufacturing; (2) research the most effective methods for providing technician training in multiple delivery formats (traditional, audio, visual, digitized, CD-ROM, Internet, etc.); (3) produce a computer-based, self-paced, multimedia-supported curriculum; (4) develop educational professionals in traditional and nontraditional educational delivery systems; and (5) disseminate information about the project's educational products.

Advanced Technological Education:  
Curriculum Development and Faculty Enhancement  
Synthesizing Technological and Business Management  
Skills

**DUE 9752083**

FY1997, \$225,000

FY1998, \$225,000

*Multidisciplinary*

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Illinois State University, in partnership with Des Moines Area Community College and an advisory council from

business and industry, will develop a curriculum aimed at bringing business knowledge, skills, and attitudes into advanced technological education programs at community colleges. This project will address the need to prepare a technically competent workforce that also has teamwork skills and an understanding of competitiveness issues in the business world. The curriculum will employ a modular design, and instructors will be able to use the modules either as stand-alone units or as an articulated sequence with other programs. The curriculum will undergo multiple pilot tests and an evaluation by an external consultant.

The project's main product will be a set of three interdisciplinary modules with content determined by the industry-led advisory council. This curriculum will emphasize problem solving, real-world applications, and connections among the disciplines. The modules will be highly interactive and experiential, integrating the latest advances in computer-based role-playing and simulations, interpersonal role-playing, CD-ROM, video conferencing, and Internet applications. In the second year of the project, the prototype curriculum and the pilot test data on student learning will be disseminated via publications, workshops, and seminars.

**The Minnesota LCI Program: Enhancing Scientific  
Conceptual Learning and Technological Literacy**

**DUE 9752084**

FY1997, \$445,934

*General Science and Technology*

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This grant to Minnesota State Colleges and Universities will help to enhance students' scientific and technological literacy through the classroom-scale implementation of a hands-on, inquiry-driven teaching technique known as "laboratory-centered instruction" (LCI). Because this implementation will require changes in the institutional practices and administrative structures of Minnesota high schools and community colleges, the project will be aided by the Center for School Change.

During its 31-month duration, the LCI program will reach a minimum of 24 current or future high school instructors, 1,440 high school students, 10 community college instructors, and 9,000 community college students. Key elements of the project include (1) the development of three community college LCI learning centers and eight high school LCI model classrooms, which will serve as examples of classroom-scale LCI teaching with strong administrative support; (2) the creation of a support network of science instructors who can offer guidance to other interested

instructors and demonstrate the ability of the program to effect substantive change; and (3) the creation of a substantial multimedia library of classroom-scale LCI curricular modules.

**A Work/SITE Alliance:  
Community-Based GIS Education**

**DUE 9752086**

FY1997, \$179,558 (total: \$779,558)

FY1999, \$420,442

*Geographic Information Systems (GIS)*

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The market for GIS services is growing at a rate of 35 percent per year, but there remains a shortage of trained personnel. The Work and Spatial Information Technology Education (Work/SITE) partnership is developing a new, urban, community-based educational model that integrates GIS field experiences into high schools and prepares undergraduates in community colleges and regional universities for careers using complex GIS technologies. The development of a dynamic, flexible educational delivery system will permit students to be GIS practitioners while engaging in formal education at the certificate, associate, or bachelor's degree levels. The Work/SITE model is designed to reflect emerging national education and skill standards and to respond swiftly to changing GIS technologies and workplace applications.

The project will include the development of community-based curriculum modules, courseware, and "project kits" that will be disseminated via the Internet. In high schools, interdisciplinary teams of four teachers, with four students per teacher, will work on projects addressing urban issues that affect the communities—e.g., public safety, crime reduction, brown field redevelopment, and environmental justice. Companies and other organizations will provide real-life problems and data, for which the students will develop GIS solutions.

**Cases in Industry Practice in Biotechnology**

**DUE 9752090**

FY1997, \$210,559

FY1998, \$189,555

FY1999, \$199,869

*Biotechnology*

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Los Altos Hills, CA 94022

This project will address the two most significant shortcomings in contemporary biotechnology education: the lack of active involvement by industry in the instructional process itself, and the dearth of high-quality curriculum materials.

The project will first develop an online infrastructure that permits industrial partners to participate in the development of curricula. This infrastructure will then be utilized to develop three casebooks, containing six industry-based teaching cases, which will help students gain practical insight into the skills required for research and development, intellectual property, manufacturing, quality control, and clinical studies. These materials will be used nationwide at the high school, community college, and university levels, and they will also be suitable for use in employee training programs.

**Scientific and Technological Education in Photonics  
(STEP)**

**DUE 9752092**

FY1997, \$267,000

*Photonics*

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Photonics Research Center  
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To meet the challenge of technician training for the 21st century in the rapidly expanding photonics industry, a national consortium representing community colleges, tech prep schools, universities, industry, government labs, photonics societies, and nonprofit organizations will develop and validate an industry-driven curriculum for an Associate of Science degree in photonics. The major photonics societies, the Optical Society of America and SPIE, will provide a forum for industry leaders to determine skill standards. Two-year college faculty, supported by university researchers, will create the detailed curriculum, which will be articulated with programs in secondary schools and courses in four-year colleges. The curriculum will be evaluated

using pre- and post-instruction tests, in order to improve both its content and its implementation of educational cognitive psychology.

This project will also produce, field-test, and disseminate the introductory course "Fundamentals of Photonics," in what is expected to be an eight-course sequence.

**Academy for Creative Technologies (ACT):  
An Interdisciplinary, Interactive  
Multimedia Studies Program**

**DUE 9752096**

FY1997, \$139,724

FY1998, \$146,388

FY1999, \$93,888

*Multimedia Technology*

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(626) 585-7140

Pasadena City College will develop and implement an associate degree program to educate multimedia technicians. This program will be based on a solid core curriculum in the sciences, the arts, and computer technology and will emphasize 21st-century workplace skills, such as those outlined in the SCANS (Secretary's Commission on Achieving Necessary Skills) recommendations. The program's development will be industry-driven and will involve a variety of real-world industrial experiences, including an intensive internship and a culminating interdisciplinary project in which teams of students will work with faculty in a variety of disciplines to develop a multimedia product for instructional use. The curriculum will also be articulated with programs in high schools and four-year colleges.

Objectives of this project are (1) to improve the quality and quantity of technicians educated for careers in advanced multimedia technologies, (2) to increase the involvement of industry in preparing multimedia technicians, (3) to increase the use of multimedia as an instructional tool by high school and college faculty, and (4) to create an opportunity for students to experience a seamless multimedia technical education from high school through community college to four-year college and/or the workplace.

**Image Processing for Teaching in Advanced  
Technological Education: Faculty and Teacher  
Development and Curriculum Materials**

**DUE 9752101**

FY1997, \$259,484

FY1998, \$449,484

*Image Processing*

Melanie Magisos *mmagisos@aol.com*  
Center for Image Processing in Education (520) 322-0118  
4500 E. Speedway Blvd., Suite 58  
Tucson, AZ 85712

This project is a two-year renewal of a successful project (DUE 9454520) started in 1995 by the Center for Image Processing in Education. The project focuses on introducing digital image processing technology to educators of students studying for careers as technicians, and it responds to the need for educators to develop teaching tools that engage students' imaginations and to integrate technology into curricula.

Objectives for the renewal period include (1) continuing to provide high-quality professional development opportunities tailored to the needs of high school and community college educators involved in technology-oriented fields such as biotechnology, environmental technology, and agricultural technology; (2) continuing to develop instructional materials for technology education, both completing materials begun during the first period of funding and developing new materials covering areas identified by educators and the project's advisory board; (3) maintaining and expanding the effective infrastructure for disseminating the materials through workshops, and continuing to provide strong follow-up support and to reach out to potential users; and (4) developing a strong summative evaluation program that effectively employs both quantitative and qualitative analyses.

**Science Technology: Knowledge and Skills—  
Phase II**

**DUE 9752102**

FY1997, \$399,056 (total: \$639,696)

*Multidisciplinary*

Sylvia A. Ware *saw97@acs.org*  
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This award extends a project previously funded under DUE 9454564.

SciTeKS (Science Technology: Knowledge and Skills) is an interdisciplinary, modular technology education curriculum being developed for students in grades 11



and 12. It integrates biology, chemistry, and earth science within educational modules that use an industrial, problem-based format to introduce high school students to science-oriented technology. Each of the 14 five-week modules is being designed to create a “virtual workplace” for students through laboratory experiences, computer-based multimedia, and video. While working through each module, students apply scientific knowledge and laboratory skills, and practice problem solving, in an industrial, real-world context. Students’ skills and knowledge are assessed throughout the program using a variety of methods: industry-related multimedia simulations, labs, and presentations; journal analysis; self-assessment; and assessment by teachers.

The modules are being developed by a writing team working in close collaboration with technology educators and representatives from industry. After the modules are reviewed and revised, they are field-tested by teachers in a variety of high school settings (tech prep programs, general technology education programs, and traditional science classes) across the country. Results from the field tests are then used to revise the modules further in preparation for their dissemination by a commercial publisher.

### **Mechanized Agriculture Technology Partnership**

**DUE 9752106**

FY1997, \$49,433

*Agriculture*

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Dept. of Mechanized Agriculture  
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Reedley, CA 93654

(209) 638-0310

This grant will help Kings River Community College develop plans for preparing well-qualified technicians within its mechanized agriculture program. The college especially wishes to attract minorities and women as nontraditional entrants into the field. Employment in this sophisticated area of technology requires a solid background in various fields of mathematics and physical science. Proper training requires adequate teaching and demonstration equipment and materials of an advanced technological nature.

Planning activities will focus on assessing curriculum needs; developing ways to take advantage of extant materials and programs in mechanized agricultural technology; setting up industrial partnerships; and formulating strategies that encourage participation by students underrepresented in science, mathematics, and technology.

## SPECIAL PROJECTS

### New Awards (1997)

#### **Forging Connections Between Business, Education, and Government for Strengthening Technological Skills Among Urban Students**

**DUE 9702044**  
FY1996, \$28,142  
FY1997, \$56,285  
*Multidisciplinary*

Nancy DeSombre (312) 984-2885  
City Colleges of Chicago Harold Washington College  
30 E. Lake St.  
Chicago, IL 60601-2420

With the increased use of technology in corporate America, industry can no longer accept employees who lack technical skills. Urban community colleges and their high school partners are uniquely positioned to assume a lead role in preparing the workforce necessary for industry to remain productive in urban areas. Partnerships between industry, public schools, and community colleges must be established with the central purpose of preparing students for technical careers and giving them access to other careers that depend on the use of technical information.

This grant will enable the city of Chicago, along with nine other large urban cities, to conduct a national conference on establishing partnerships between urban community colleges, business and industry, secondary schools, and government in order to prepare students in urban communities to enter and succeed in the technical workforce. The conference, coordinated by a national steering committee, will involve officials from the mayor's office, representatives from business and industry, the superintendent of the public schools, and the chancellor or president of the community college system in nine major cities: Baltimore, Chicago, Cincinnati, Cleveland, Detroit, Los Angeles, Miami, New York, and St. Louis.

#### **Strengthening the Community College Network for Science, Mathematics, Engineering, and Technology Education**

**DUE 9713868**  
FY1997, \$396,937  
*Multidisciplinary*

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American Association of Community Colleges (202) 728-0200  
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Washington, DC 20036

This project consists of a sequence of three interconnected activities designed to enhance the quality of science, mathematics, engineering, and technological (SMET) education in community colleges:

(1) In the fall of 1997, a national conference of community college SMET educators will bring together representatives from groups interested in advanced technological education, including principal investigators from current ATE projects and centers, leaders from the private and public sectors, and representatives from professional associations.

(2) "A Case Study of the ATE Program" will look at what has been accomplished through the four-year-old program and its relationship with relevant stakeholders (businesses, schools, four-year colleges and universities, and others). Focusing on approximately ten projects, the analysis will result in a 100- to 150-page monograph, which will be widely distributed throughout the community college community and will be used to shape Activity (3) described below.

(3) In the fall of 1998, a national conference of community college SMET educators will discuss the findings of the assessment conducted in Activity (2). A conference report including these recommendations will be shared with conference participants and distributed to other audiences with an interest in SMET education.

## Case Studies of Mathematics in ATE Projects

**DUE 9713869**

FY1997, \$187,459

*Mathematics*

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CUNY Bronx Community College                      (718) 289-5372  
Dept. of Mathematics  
University Ave. and West 181st St.  
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This project will examine other selected ATE projects to identify the characteristics of strong mathematical components and to chronicle the process of developing such components. A series of case studies will be made available in print and on the Internet. This information will be used by current and future ATE project directors to develop a more sophisticated understanding of the mathematical skills that students preparing for technological careers are expected to have and to develop a more realistic view of what ATE programs should accomplish in mathematics.

The project aims to enrich mathematics education for students in vocational and technological education programs by (1) creating a vision of an appropriate mathematics curriculum for these programs, a curriculum consistent with the high academic standards developed by numerous organizations, and (2) developing and publicizing a variety of effective strategies for creating challenging mathematical tasks for students.

# PROJECTS MANAGED BY OTHER NSF PROGRAMS AND CO-FUNDED BY ATE

## New Awards (1997)

The ATE Program is contributing funds to several proposals that were submitted to and funded through other programs. The ATE co-funding will ensure that these projects make the education of technicians a priority. Below, the ATE contribution is listed first, and the total award from all NSF sources is given in parentheses.

### Technology for All Americans—Phase II

#### ESI 9626809

FY1997, \$250,000 (total: \$501,905)

FY1998, \$200,000 (total: \$419,755)

FY1999, \$250,000 (total: \$539,060)

#### General Technology

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International Technology Education (540) 953-0203  
Association  
Technology for All Americans Project  
1997 S. Main St., Suite 701  
Blacksburg, VA 24061-0353

This project will extend work funded in previous years under ESI 9355826 and ESI 9641641.

The document *Technology for All Americans: A Rationale and Structure for the Study of Technology*, produced by the International Technology Education Association, identifies the following elements of technology that should serve as a foundation for developing students' technological literacy: (1) designing and developing technological systems, (2) determining and controlling the behavior of technological systems, (3) utilizing technological systems, (4) assessing the impacts and consequences of technological systems, (5) knowledge of contextual relationships, (6) knowledge of the nature and evolution of technology, and (7) technological concepts and principles. Using these elements as a guide, this project is developing standards for what technological concepts and processes students should understand and be able to apply in grades K–12, with benchmarks at grades 2, 5, 8, and 12.

The standards are being compiled by a small central staff. A standards team—consisting of administrators, technology educators (both teachers and teacher educators), and representatives from science, mathematics, and engineering—provides the content. An advisory group, consisting of individuals who have been involved in developing other standards, provides recommendations for the standards development process. Consensus on the standards is being developed through hearings conducted at professional conferences and through reviews conducted via mail and via the World Wide Web. Third party evaluation is being used to

monitor the content and the process, to ensure that the standards will be useful in a variety of contexts.

### Revitalizing Classroom Teaching and Learning: A Beginning for Two-Year College Mathematics

#### DUE 9653224

FY1997, \$49,799 (total: \$99,799)

#### Mathematics

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This project will provide a model for curriculum reform that focuses on problem solving and real world applications in introductory mathematics at two-year colleges—specifically, in college algebra and statistics, two courses that have great importance for the technical workforce. The project has three objectives: (1) to revise the mathematics curriculum, incorporating work-based experiences, technology, and an interactive learning environment; (2) to expand faculty dialogue to include perspectives from the secondary level as well as the two- and four-year postsecondary levels; and (3) to provide opportunities for faculty development in support of collaborative teaching methodologies, student engagement in learning, and curriculum development.

To accomplish the above objectives, the project will give faculty members opportunities (1) to interact with local businesses and industries through site visits, shadowing, and internships; (2) to increase teamwork and faculty interaction by participating in professional development activities; (3) to improve their understanding of learning styles, collaborative learning, and the use of technology as a tool for problem solving; and (4) to engage in team efforts to develop, pilot, refine, and implement new teaching methods, work-based problems, and strategies for student interaction. The participating faculty will keep diaries of mathematics applications in the workplace as they visit local businesses and industries. They will also develop teaching portfolios, which will detail the types of learning activities and methodologies they have introduced into classes, discuss why some strategies were

more successful than others, and describe students' reactions.

### **SPIRAL Physics Active Learning Workbooks**

#### **DUE 9653228**

FY1996, \$33,360 (total: \$66,360)

*Physics*

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In response to increasing evidence of the ineffectiveness of traditional introductory physics courses in improving students' conceptual understanding of physics and their problem solving abilities, a series of workbooks, *SPIRAL Physics*, has been developed and used in place of a standard textbook in the introductory physics course sequence at Monroe Community College during the past several years. These workbooks, designed for use in an active learning environment, arrange topics such that students receive repeated exposure to concepts over an extended period of time, with each exposure presenting an incremental increase in conceptual complexity. The workbooks make extensive use of alternative problem types, such as ranking tasks, goalless problem statements, and critical analysis tasks.

This project will expand and modify the workbooks to make them a more attractive alternative to traditional physics instruction at other institutions. In addition, support materials, including an instructor guide, student guide, and textbook, will be developed. An advisory committee drawn from both the two-year college physics community and the community of physics education researchers will supervise the revision of the workbooks and support materials. The project will give special emphasis to community college students in ATE programs to ensure that *SPIRAL Physics* provides them appropriate learning opportunities.

### **Industry-Education Conference on Workforce Development for the U.S. Semiconductor Industry**

#### **DUE 9653429**

FY1996, \$50,000 (total: \$100,000)

*Semiconductor Manufacturing*

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Portland Community College (503) 533-2929  
Dept. of Microelectronics Technology  
18624 NW Walker Rd.  
Beaverton, OR 97006

Developing a competitive, world-class technical workforce for the U.S. semiconductor industry is a big challenge today. Major expansions in this critical industry are occurring in Oregon, Arizona, New Mexico, Virginia, and Maine. Community colleges and secondary schools in these states are ramping up programs to prepare the needed workforce.

This project will continue a successful national conference on advanced technological education in semiconductor manufacturing, which has served as a forum for educators and industry representatives to share best practices, discuss industry's needs, and enhance faculty capability through presentations and workshops. The project will fund annual conferences in 1997 and 1998.

## ACTIVE AND NEW ATE AWARDS FY1997

(excluding ATE-supported awards managed by other programs)

The following list includes new awards made during FY1997, as well as awards made during previous years but still active during FY1997. The list includes only awards managed by the ATE Program, not awards that have received a contribution from ATE but are managed by other programs. Award data have been compiled from the NSF main database.

The awards are arranged by the field of technology or science that is their primary focus; however, many of the projects embrace multiple fields or focus on general education in mathematics or science. ATE centers are denoted by an asterisk (\*). The "Abstract Location" column gives the NSF publication number of the *Awards and Activities* book in which an award's abstract can be found.

Abstracts and other award data are also available through the NSF's World Wide Web site at <<http://www.nsf.gov>>.

FIELD OF TECHNOLOGY Institution	State	PI	Award No.	\$ Total	Award Effective Date	Est. Award Duration (months)	Abstract Location
<b>AGRICULTURE</b>							
Hawkeye Comm. Coll.	IA	Brase	9553751	200,000	08/01/95	36	NSF 97-50, p. 51
Hawkeye Comm. Coll.	IA	Brase	9752081	700,000	08/01/97	36	This book, p. 18
Kings River Comm. Coll.	CA	Clark	9752106	49,433	08/01/97	12	This book, p. 22
U. of New Hampshire	NH	Giles	9752053	74,954	07/01/97	18	This book, p. 15
<b>BIOTECHNOLOGY</b>							
Broward Comm. Coll.	FL	Sanders	9602383	250,000	08/01/96	36	NSF 97-50, p. 33
California State U., Hayward	CA	Stronck	9454502	250,000	10/01/94	36	NSF 97-50, p. 54
Cold Spring Harbor Lab.	NY	Micklos	9752037	599,825	08/01/97	36	This book, p. 14
De Anza Coll.	CA	Sheikholeslam	9553708	225,305	09/01/95	30	NSF 97-50, p. 49
Education Development Ctr.	MA	Leff	9752051	399,985	09/01/97	24	This book, p. 15
Foothill Coll.	CA	Carter	9752090	599,983	09/01/97	36	This book, p. 20
Georgetown U.	DC	Chirikjian	9553661	250,000	09/01/95	36	NSF 97-50, p. 43
Madison Area Tech. Coll.	WI	McMillan	9454555	1,000,000	10/01/94	48	NSF 97-50, p. 55
Madison Area Tech. Coll.	WI	McMillan	9752027	360,000	10/01/97	24	This book, p. 13
Middlesex Comm. Coll.	MA	Werner	9454642	1,132,394	01/01/95	48	NSF 97-50, p. 58
Nat'l Assn. of Biology Teachers	VA	Frame	9553720	499,239	10/01/95	36	NSF 97-50, p. 50
Rutgers, The State U. of N.J.	NJ	Ward	9602356	350,000	07/15/96	36	NSF 97-50, p. 29
SUNY Stony Brook	NY	Bynum	9602450	450,000	08/15/96	24	NSF 97-50, p. 39
Vista Comm. Coll.	CA	Des Rochers	9454657	209,074	10/01/94	48	NSF 97-50, p. 59
<b>CHEMICAL TECHNOLOGY</b>							
City Colleges of Chicago Truman Coll.	IL	Soucek	9602443	349,999	09/01/96	36	NSF 97-50, p. 39
Edmonds Comm. Coll.	WA	O'Brien	9602403	399,470	08/01/96	42	NSF 97-50, p. 36
Miami U., Middletown	OH	Sarquis	9454518	1,200,000	10/01/94	48	NSF 97-50, p. 54
Miami U., Middletown	OH	Sarquis	9751993	825,720	10/01/97	24	This book, p. 9
Michigan Technological U.	MI	Fisher	9553671	499,996	09/01/95	36	NSF 97-50, p. 44
Southeast Comm. Coll.	NE	Kenkel	9553674	191,590	01/01/96	36	NSF 97-50, p. 44
Southeast Comm. Coll.	NE	Kenkel	9751998	398,479	07/15/97	24	This book, p. 10
U. of Cincinnati	OH	Kryman	9602437	1,098,276	09/01/96	36	NSF 97-50, p. 38

## ELECTRONICS

Alvin Comm. Coll.	TX	Sweeney	9454508	247,823	09/01/94	36	NSF 96-54, p. 33
Front Range Comm. Coll.	CO	Bryan	9553685	301,783	09/01/95	36	NSF 97-50, p. 45
N. Seattle Comm. Coll.	WA	Eyres	9553726	600,000	09/01/95	36	NSF 97-50, p. 51

## ENVIRONMENTAL TECHNOLOGY

Chemeketa Comm. Coll.*	OR	Cudmore	9553760	2,998,443	10/01/95	36	NSF 97-50, p. 24
Hazardous Materials Training and Research Inst.*	IA	Kabat	9454638	2,999,866	10/01/94	48	NSF 97-50, p. 25
Hazardous Materials Training and Research Inst.*	IA	Kabat	9714425	2,000,000	09/15/97	36	This book, p. 6
INTELECOM Intelligent Telecommunications	CA	Beaty	9454521	1,499,966	09/01/94	48	NSF 97-50, p. 55
INTELECOM Intelligent Telecommunications	CA	Beaty	9751988	986,000	09/01/97	24	This book, p. 9
Kansas State U., Salina	KS	Swanson	9553753	75,000	10/01/95	21	NSF 96-54, p. 30
Mesa State Coll.	CO	Topper	9454633	399,778	10/01/94	48	NSF 97-50, p. 57
Mount Hood Comm. Coll.	OR	Jackman	9751983	169,158	07/15/97	24	This book, p. 8
Northwest Indian Coll.	WA	Burns	9752076	775,049	09/01/97	36	This book, p. 18
Partnership for Environmental Technology Ed.	CA	Dickinson	9602365	600,000	10/01/96	24	NSF 97-50, p. 31
Pima County Comm. Coll.	AZ	Ogden	9602368	330,000	10/01/96	36	NSF 97-50, p. 31
Stark Tech. Coll.	OH	Cramer	9553768	516,219	09/01/95	48	NSF 97-50, p. 53
Trident Tech. Coll.	SC	Almquist	9553696	267,965	09/01/95	36	NSF 97-50, p. 47
U. of Alaska Southeast, Sitka	AK	Carnegie	9553680	600,000	10/01/95	36	NSF 97-50, p. 45
U. of Minnesota, Duluth	MN	Munson	9752017	656,576	07/01/97	36	This book, p. 11
U. of Nevada Desert Research Inst.	NV	Wetzel	9602351	450,000	10/01/96	36	NSF 97-50, p. 28

## GENERAL or INTERDISCIPLINARY

Alamo Comm. Coll. District	TX	Gonzales	9454572	99,984	10/01/94	36	NSF 95-6, p. 19
Amarillo Coll.	TX	Jones	9454651	630,000	09/01/94	48	NSF 97-50, p. 59
Amer. Assn. of Comm. Colleges	DC	Barnett	9713868	416,261	08/01/97	30	This book, p. 23
Amer. Assn. of Comm. Colleges	DC	Mahoney	9552975	273,110	09/01/95	30	NSF 97-50, p. 61
Amer. Chemical Society	DC	Lavallee	9454564	1,500,000	09/01/94	48	NSF 97-50, p. 56
Amer. Chemical Society	DC	Ware	9752102	639,696	09/01/97	24	This book, p. 21
City Colleges of Chicago Harold Washington Coll.	IL	DeSombre	9634670	9,554	06/15/96	6	NSF 97-50, p. 61
City Colleges of Chicago Harold Washington Coll.	IL	DeSombre	9702044	84,427	02/01/97	18	This book, p. 23
Colorado State U.	CO	James	9602376	75,000	08/01/96	24	NSF 97-50, p. 33
Harvard U.	MA	Sadler	9602404	373,927	01/01/97	24	NSF 97-50, p. 36
Illinois State U.	IL	Meier	9752083	450,000	09/01/97	24	This book, p. 19
Itasca Comm. Coll.	MN	Wenger	9752084	445,961	06/01/97	31	This book, p. 19
MPR Associates	CA	Hoachlander	9752036	399,913	08/15/97	36	This book, p. 14
Mission Coll.	CA	Behm	9602345	500,000	01/01/97	24	NSF 97-50, p. 27
Nat'l Alliance of Business	DC	Joyce	9602352	399,972	09/01/96	24	NSF 97-50, p. 28
Phi Theta Kappa	DC	Risley	9602459	239,912	09/01/96	24	NSF 97-50, p. 41
Rose-Hulman Inst. of Technology	IN	Brown	9553705	475,000	09/01/95	36	NSF 97-50, p. 48
Texas State Tech. Coll., Sweetwater*	TX	Musgrove	9454643	1,766,637	10/01/94	42	NSF 97-50, p. 24
Texas State Tech. Coll., Sweetwater*	TX	Musgrove	9714435	1,253,697	10/01/97	36	This book, p. 7
Wake Tech. Comm. Coll.	NC	Kimball	9752038	119,999	09/01/97	24	This book, p. 14
West Valley-Mission Comm. Coll. District	CA	Behm	9454513	300,000	12/01/94	36	NSF 97-50, p. 54

## GEOGRAPHIC INFORMATION SYSTEMS

Geological Society of America	CO	Geary	9602408	614,684	10/01/96	36	NSF 97-50, p. 37
Henry Ford Comm. Coll.	MI	Brown	9752086	1,200,000	09/01/97	36	This book, p. 20
Indiana State U.	IN	Dando	9553694	306,250	09/01/95	36	NSF 97-50, p. 46
Kansas State U., Salina	KS	Keating	9454618	500,000	09/01/94	36	NSF 97-50, p. 57
Prince George's Comm. Coll.	MD	Cunniff	9553662	694,941	09/01/95	36	NSF 97-50, p. 43
U. of California, Santa Barbara	CA	Goodchild	9602348	188,469	07/01/96	24	NSF 97-50, p. 27

## INFORMATION TECHNOLOGY, TELECOMMUNICATIONS

Bellevue Comm. Coll.*	WA	Evans	9553727	2,992,054	09/01/95	36	NSF 97-50, p. 23
CUNY New York City Tech. Coll.	NY	Cook	9553738	156,055	08/15/95	24	NSF 96-54, p. 29
CUNY Queensborough Comm. Coll.	NY	Mohr	9454613	513,000	09/15/94	46	NSF 97-50, p. 56
CUNY Queensborough Comm. Coll.	NY	Mohr	9602369	600,000	09/15/96	36	NSF 97-50, p. 32
Daytona Beach Comm. Coll.	FL	Williams	9752054	551,106	09/01/97	36	This book, p. 16
Jones County Junior Coll.	MS	Cotten	9752060	1,082,122	05/15/97	36	This book, p. 16
Middlesex County Coll.	NJ	Beyer	9602375	309,983	10/01/96	24	NSF 97-50, p. 33
Minn. Riverland Tech. Coll.	MN	Stevens	9454551	515,000	10/01/94	36	NSF 96-54, p. 36
Nashville State Tech. Inst.	TN	Rogers	9602401	449,594	10/01/96	24	NSF 97-50, p. 35
San Jose State U.	CA	Ibrahim	9752004	199,944	07/15/97	12	This book, p. 10
Springfield Tech. Comm. Coll.*	MA	Masi	9751990	3,000,000	09/01/97	36	This book, p. 5
Springfield Tech. Comm. Coll.	MA	Mullett	9602433	400,000	10/01/96	24	NSF 97-50, p. 38
U. of Hawaii Maui Comm. Coll.	HI	Converse	9454647	499,938	10/01/94	36	NSF 97-50, p. 58

## INSTRUMENTATION, MACHINE TOOLS, METROLOGY

Colorado Comm. Coll. and Occupational Ed. System	CO	Goodwin	9553706	298,464	09/01/95	36	NSF 97-50, p. 49
Madison Area Tech. Coll.	WI	Anderegg	9553684	155,036	09/01/95	21	NSF 96-54, p. 22
Madison Area Tech. Coll.	WI	Anderegg	9752032	299,900	09/01/97	24	This book, p. 13
Piedmont Tech. Coll.	SC	Campbell	9454536	123,904	09/01/94	48	NSF 96-54, p. 35
Texas State Tech. Coll., Waco	TX	Pelton	9553716	1,550,000	09/01/95	36	NSF 97-50, p. 50

## LASERS, FIBER OPTICS, PHOTONICS

CUNY Queensborough Comm. Coll.	NY	Lieberman	9752061	600,000	09/01/97	36	This book, p. 17
New England Bd. of Higher Ed.	MA	Massa	9553762	365,100	08/01/95	30	NSF 97-50, p. 52
U. of Connecticut	CT	Roychoudhuri	9752092	267,000	10/01/97	24	This book, p. 20

## MANUFACTURING, ENGINEERING

Camden County Coll.	NJ	Roberts	9454538	160,000	09/15/94	48	NSF 95-6, p. 27
Cleveland State U.	OH	Schoenig	9602457	608,756	09/01/96	24	NSF 97-50, p. 40
Consortium for Advanced Manufacturing Internat'l	TX	Jordan	9454655	1,495,500	09/15/94	36	NSF 97-50, p. 59
Edison Industrial Systems Ctr.	OH	Sully	9602431	1,200,000	09/01/96	40	NSF 97-50, p. 38
Houston Comm. Coll.	TX	Sheinberg	9454569	609,500	09/15/94	34	NSF 96-54, p. 37
Indiana U.-Purdue U. Indianapolis	IN	Cooney	9553699	297,475	10/01/95	30	NSF 97-50, p. 47
Iowa State U.	IA	Schmerr	9602370	673,705	10/01/96	36	NSF 97-50, p. 32
Johns Hopkins U.	MD	Packer	9553664	1,344,676	09/01/95	36	NSF 97-50, p. 43
Keene State Coll.	NH	Simoneau	9553767	548,260	09/01/95	36	NSF 97-50, p. 52
Middlesex County Coll.*	NJ	Waintraub	9553749	2,966,472	09/01/95	36	NSF 97-50, p. 23
New Mexico State U.	NM	Smolleck	9602430	169,177	08/15/96	30	NSF 97-50, p. 37
Norfolk State U.	VA	Jacobs	9751987	66,900	10/01/97	18	This book, p. 9
N.C. State Bd. of Comm. Colleges	NC	Girardeau	9553709	119,650	10/01/95	36	NSF 97-50, p. 49
Oklahoma State U., Okmulgee	OK	Allison	9602390	600,000	07/01/96	24	NSF 97-50, p. 35
Penn. State U.	PA	Hager	9454547	658,000	10/01/94	36	NSF 96-54, p. 35
Piedmont Comm. Coll.	VA	Pittman	9752021	600,000	06/15/97	36	This book, p. 12
Piedmont Tech. Coll.	SC	Mack	9553740	1,419,128	09/01/95	36	NSF 97-50, p. 51
Purdue U.	IN	Depew	9602355	1,348,391	08/01/96	60	NSF 97-50, p. 29



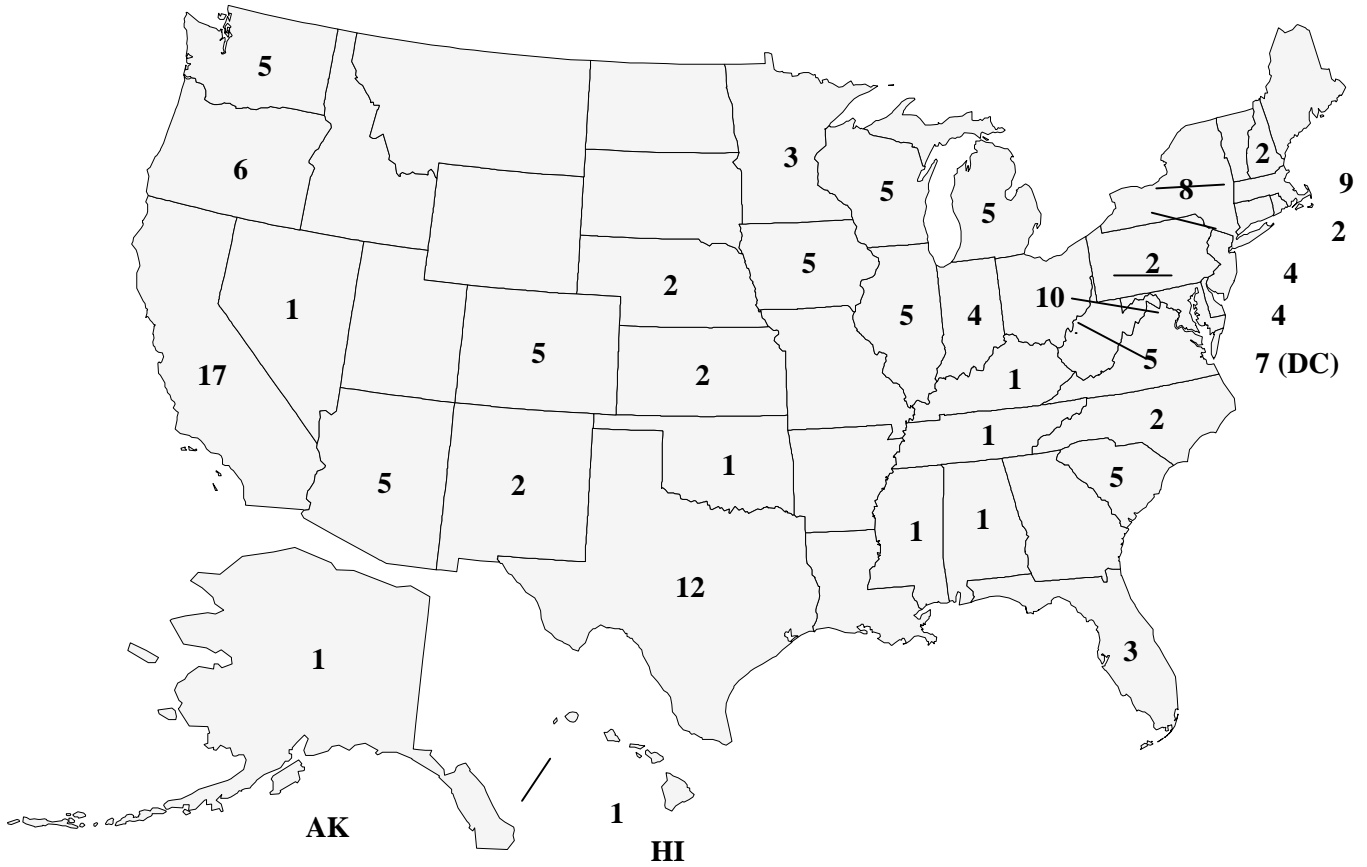
Rio Grande Ctr. for Manufacturing	TX	Bose	9553701	100,340	09/01/95	24	NSF 97-50, p. 47
Sinclair Comm. Coll.	OH	Anderson	9752015	100,000	08/01/97	24	This book, p. 11
Sinclair Comm. Coll.*	OH	Harrison	9454571	3,000,000	01/01/95	36	NSF 97-50, p. 25
Sinclair Comm. Coll.*	OH	Harrison	9714424	2,000,000	01/01/98	36	This book, p. 6
Sinclair Comm. Coll.	OH	Sehi	9550659	111,319	04/15/95	24	NSF 96-54, p. 44
S.C. State Bd. of Tech. and Comprehensive Ed.*	SC	Craft	9602440	2,100,000	09/01/96	36	NSF 97-50, p. 21
Trident Tech. Coll.	SC	Whipple	9752062	240,000	09/01/97	24	This book, p. 17
U. of Washington	WA	Stoebe	9602360	221,174	01/01/97	48	NSF 97-50, p. 30
Waukesha County Tech. Coll.	WI	Timmer	9752082	700,000	08/01/97	36	This book, p. 19
Wayne State U.	MI	Rathod	9553692	149,900	09/01/95	24	NSF 97-50, p. 46
Wayne State U.	MI	Rathod	9752024	450,000	09/01/97	36	This book, p. 12
Wytheville Comm. Coll.	VA	Laing	9454577	197,873	09/15/94	36	NSF 96-54, p. 37
Wytheville Comm. Coll.	VA	Tice	9602397	299,694	09/15/96	24	NSF 97-50, p. 35
<b>MARINE TECHNOLOGY, AQUACULTURE</b>							
Monterey Peninsula Coll.	CA	Crane	9602384	74,841	10/01/96	12	NSF 97-50, p. 34
Monterey Peninsula Coll.*	CA	Crane	9752028	2,997,246	09/15/97	36	This book, p. 5
New England Bd. of Higher Ed.	MA	Stewart	9752050	449,975	07/01/97	36	This book, p. 15
<b>MATHEMATICS</b>							
Adirondack Comm. Coll.	NY	Patrick	9553765	603,954	09/01/95	36	NSF 97-50, p. 52
Capital Comm. Tech. Coll.	CT	Pazdar	9602456	259,914	09/01/96	36	NSF 97-50, p. 40
Ctr. for Occupational Res. and Development	TX	Souders	9602361	107,817	10/01/96	12	NSF 97-50, p. 30
CUNY Bronx Comm. Coll.	NY	Forman	9713869	187,459	09/01/97	24	This book, p. 24
Lane Comm. Coll.	OR	Shellabarger	9752058	262,800	10/01/97	36	This book, p. 16
Maricopa Comm. Coll. District	AZ	Jacobs	9602386	353,235	09/01/96	36	NSF 97-50, p. 34
Mount Hood Comm. Coll.	OR	Curtis	9454627	469,923	09/01/94	48	NSF 97-50, p. 57
U. of Kentucky Comm. Coll. System	KY	Newberry	9454585	799,991	10/01/94	39	NSF 97-50, p. 56
Wentworth Inst. of Technology	MA	Simundza	9553704	492,392	09/01/95	36	NSF 97-50, p. 48
<b>MULTIMEDIA TECHNOLOGY</b>							
Ctr. for Image Processing in Ed.	AZ	Magisos	9454520	1,361,831	01/01/95	40	NSF 97-50, p. 55
Ctr. for Image Processing in Ed.	AZ	Magisos	9752101	708,968	10/01/97	24	This book, p. 21
John C. Calhoun State Comm. Coll.	AL	Mitchell	9752014	96,959	09/01/97	12	This book, p. 11
Pasadena City Coll.	CA	Carter	9752096	380,000	09/01/97	36	This book, p. 21
Texas State Tech. Coll., Harlingen	TX	Hobbs	9553741	100,000	09/01/95	24	NSF 96-54, p. 30
<b>PHYSICS</b>							
Amer. Assn. of Phys. Teachers	MD	Monroe	9450160	1,185,405	03/15/95	36	NSF 97-50, p. 62
Amer. Inst. of Phys.	MD	Neuschatz	9453180	385,680	07/01/95	36	NSF 97-50, p. 61
Austin Comm. Coll.	TX	Rodi	9553689	318,715	09/01/95	40	NSF 97-50, p. 46
Concord Consortium	MA	Tinker	9454575	432,743	10/01/94	39	NSF 97-50, p. 56
Henry Ford Comm. Coll.	MI	Eshelman	9454620	146,738	09/01/94	48	NSF 96-54, p. 39
Seminole Comm. Coll.	FL	Dickison	9553665	429,521	10/01/95	36	NSF 97-50, p. 44
<b>PLASTICS MANUFACTURING</b>							
Penn. Coll. of Technology	PA	Weston	9751984	600,735	08/15/97	24	This book, p. 8
<b>SEMICONDUCTOR MANUFACTURING</b>							
Albuquerque Tech. Vocational Inst.	NM	Willis	9602349	421,318	10/01/96	36	NSF 97-50, p. 27
Hillsboro School District	OR	Miller	9752025	205,224	10/01/97	36	This book, p. 12

Maricopa Comm. Coll. District*	AZ	de los Santos	9602373	2,713,446	09/01/96	36	NSF 97-50, p. 21
Portland Comm. Coll.	OR	Hata	9454589	200,000	11/01/94	36	NSF 96-54, p. 38
TRANSPORTATION							
Coll. of the Desert	CA	Pulliam	9602448	299,980	08/01/96	24	NSF 97-50, p. 39
WELDING							
Northern Illinois U.	IL	Song	9553687	213,851	09/01/95	24	NSF 96-54, p. 22



# DISTRIBUTION OF ACTIVE AND NEW ATE AWARDS BY STATE FY1997

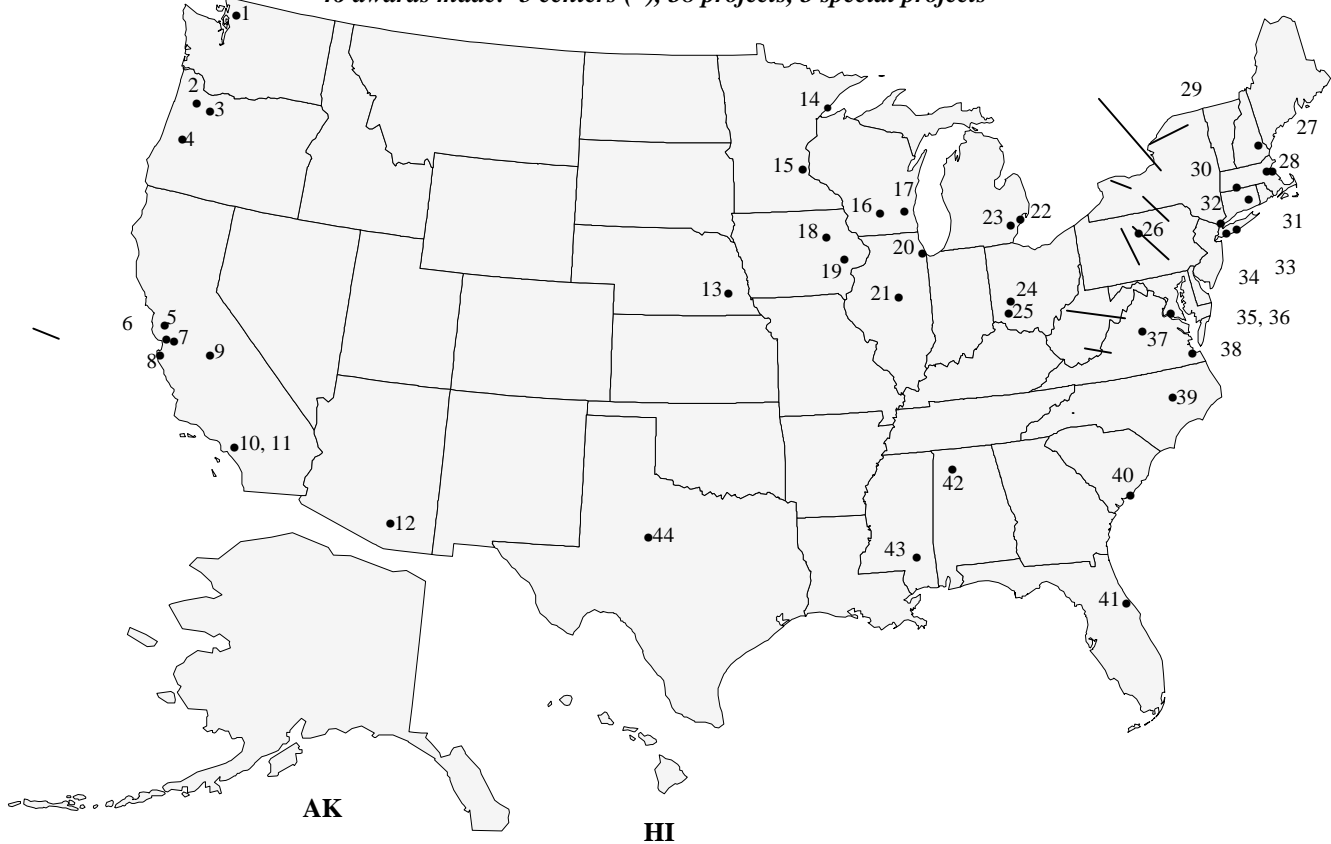
(excluding ATE-supported awards managed by other programs)



# NEW ATE AWARDS FY1997

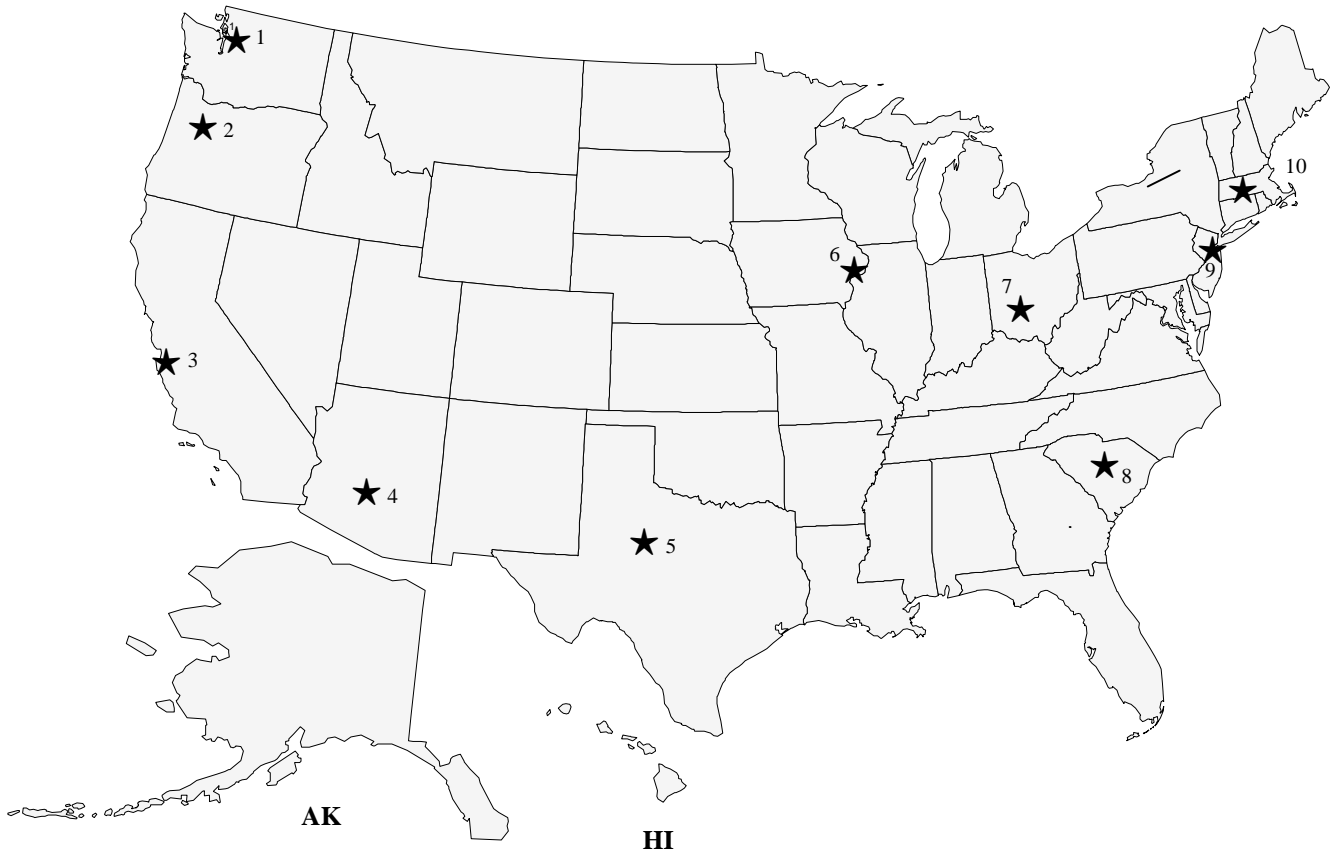
(excluding ATE-supported awards managed by other programs)

*138 proposals received*  
*46 awards made: 5 centers (\*), 38 projects, 3 special projects*



- |   |   |
|---|---|
| 1. Northwest Indian Coll. (Bellingham, WA)                          | 23. Henry Ford Comm. Coll. (Dearborn, MI)                   |
| 2. Hillsboro School Dist. (Hillsboro, OR)                           | 24. Sinclair Comm. Coll.* (2) (Dayton, OH)                  |
| 3. Mount Hood Comm. Coll. (Gresham, OR)                             | 25. Miami U. at Middletown (Middletown, OH)                 |
| 4. Lane Comm. Coll. (Eugene, OR)                                    | 26. Pennsylvania Coll. of Technology (Williamsport, PA)     |
| 5. MPR Associates (Berkeley, CA)                                    | 27. U. of New Hampshire (Durham, NH)                        |
| 6. Foothill Coll. (Los Altos Hills, CA)                             | 28. New England Bd. of Higher Ed. (Boston, MA)              |
| 7. San Jose State U. (San Jose, CA)                                 | 29. Ed. Development Ctr. (Newton, MA)                       |
| 8. Monterey Peninsula Coll.* (Monterey, CA)                         | 30. Springfield Tech. Comm. Coll.* (Springfield, MA)        |
| 9. Kings River Comm. Coll. (Reedley, CA)                            | 31. U. of Connecticut (Storrs, CT)                          |
| 10. INTELECOM Intelligent Telecommunications (Pasadena, CA)         | 32. CUNY Bronx Comm. Coll. (Bronx, NY)                      |
| 11. Pasadena City Coll. (Pasadena, CA)                              | 33. Cold Spring Harbor Lab. (Cold Spring Harbor, NY)        |
| 12. Ctr. for Image Processing in Ed. (Tucson, AZ)                   | 34. CUNY Queensborough Comm. Coll. (Bayside, NY)            |
| 13. Southeast Comm. Coll. (Lincoln, NE)                             | 35. Amer. Assn. of Comm. Colleges (Washington, DC)          |
| 14. U. of Minnesota at Duluth (Duluth, MN)                          | 36. Amer. Chemical Society (Washington, DC)                 |
| 15. Minnesota State Colleges and Universities (St. Paul, MN)        | 37. Piedmont Comm. Coll. (Charlottesville, VA)              |
| 16. Madison Area Tech. Coll. (2) (Madison, WI)                      | 38. Norfolk State U. (Norfolk, VA)                          |
| 17. Waukesha County Tech. Coll. (Pewaukee, WI)                      | 39. Wake Tech. Comm. Coll. (Raleigh, NC)                    |
| 18. Hawkeye Comm. Coll. (Waterloo, IA)                              | 40. Trident Tech. Coll. (Charleston, SC)                    |
| 19. Hazardous Materials Training and Res. Inst.* (Cedar Rapids, IA) | 41. Daytona Beach Comm. Coll. (Daytona Beach, FL)           |
| 20. City Colleges of Chicago (Chicago, IL)                          | 42. John C. Calhoun State Comm. Coll. (Decatur, AL)         |
| 21. Illinois State U. (Normal, IL)                                  | 43. Jones County Junior Coll. (Ellisville, MS)              |
| 22. Wayne State U. (Detroit, MI)                                    | 44. Texas State Tech. Coll. at Sweetwater* (Sweetwater, TX) |

## ATE CENTERS OF EXCELLENCE



1. NorthWest Center for Emerging Technologies (Bellevue, WA)
2. Northwest Center for Sustainable Resources (Salem, OR)
3. Marine Advanced Technology Education Center (Monterey, CA)
4. Maricopa Advanced Technology Education Center (Tempe, AZ)
5. Southwest Center for Advanced Technological Education (Sweetwater, TX)
6. Advanced Technology Environmental Education Center (Bettendorf, IA)
7. National Center of Excellence for Advanced Manufacturing Education (Dayton, OH)
8. South Carolina Advanced Technological Education Center (Columbia, SC)
9. New Jersey Center for Advanced Technological Education (Edison, NJ)
10. Northeast Center for Telecommunications Technology (Springfield, MA)



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<b>Alabama</b>			
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<b>Alaska</b>			
U. of Alaska Southeast, Sitka	Carnegie	9553680	NSF 97-50, p. 45
<b>Arizona</b>			
Ctr. for Image Processing in Ed.	Magisos	9454520	NSF 97-50, p. 55
	Magisos	9752101	This book, p. 21
Maricopa Comm. Coll. District	Jacobs	9602386	NSF 97-50, p. 34
	de los Santos	9602373	NSF 97-50, p. 21
Pima County Comm. Coll.	Ogden	9602368	NSF 97-50, p. 31
<b>California</b>			
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Coll. of the Desert	Pulliam	9602448	NSF 97-50, p. 39
De Anza Coll.	Sheikholeslam	9553708	NSF 97-50, p. 49
Foothill Coll.	Carter	9752090	This book, p. 20
INTELECOM Intelligent Telecommunications	Beaty	9454521	NSF 97-50, p. 55
	Beaty	9751988	This book, p. 9
Kings River Comm. Coll.	Clark	9752106	This book, p. 22
Mission Coll.	Behm	9602345	NSF 97-50, p. 27
Monterey Peninsula Coll.	Crane	9602384	NSF 97-50, p. 34
	Crane	9752028	This book, p. 5
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Partnership for Environmental Technology Ed.	Dickinson	9602365	NSF 97-50, p. 31
Pasadena City Coll.	Carter	9752096	This book, p. 21
San Jose State U.	Ibrahim	9752004	This book, p. 10
U. of California, Santa Barbara	Goodchild	9602348	NSF 97-50, p. 27
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West Valley-Mission Comm. Coll. District	Behm	9454513	NSF 97-50, p. 54
<b>Colorado</b>			
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Colorado State U.	James	9602376	NSF 97-50, p. 33
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Mesa State Coll.	Topper	9454633	NSF 97-50, p. 57
<b>Connecticut</b>			
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	Ware	9752102	This book, p. 21
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Phi Theta Kappa	Risley	9602459	NSF 97-50, p. 41

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Seminole Comm. Coll.	Dickison	9553665	NSF 97-50, p. 44

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Amer. Inst. of Phys.	Neuschatz	9453180	NSF 97-50, p. 61
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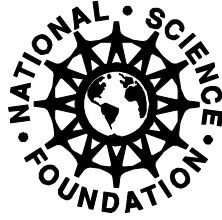
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