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ABSTRACT

This publication includes seven articles. "ATE Grants Generate Life-Changing Experiences" discusses the National Science Foundation's (NSF) Advanced Technological Education (ATE) grants, which provide seed money and other support that community college educators use to enhance technical training and improve math and science instruction. "Phone Call Has an Environmental Impact," discusses a collaboration between a Massachusetts Institute of Technology (MIT) professor and a community college teacher of environmental technology. NSF funding has helped them develop curriculum modules that use MIT research. "ATE Changes Students' Lives" describes a program at L.A. Trade Technical College in Los Angeles, in which students are part of industry-standard testing procedures that utilize real-world chemical systems in a six-module curriculum. "iTEC Adds Soft Skills to Best of Breed IT Curricula" describes a collaborative program at Daytona Beach Community College in Florida that supplements the best information technology certification programs with Teach the Teachers (T3) instruction. Instructors who go through the iTEC program receive instruction for certification in computer programs and pedagogy for presenting the new software. "Mentorships Advance Community College Innovations" describes ways that mentors can be utilized in the area of technology. Finally, "Teacher Preparation" details the role community colleges play in helping to resolve the urgent need for certified teachers across the nation. (NB)

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Advances in Technological Education

ATE Grants Generate Life-Changing Experiences

For the faculty who receive them and the students who benefit from them, the National Science Foundation's (NSF) Advanced Technological Education (ATE) grants generate life-changing experiences. The grants provide seed money and other support that community college educators use to enhance technical training and improve math and science instruction. With awards of up to $1 million a year for five years, the grants offer a significant financial boost to community colleges.

The result has been a plethora of new and improved educational programs. These programs are attracting new students into technical fields, as well as strengthening basic math and science courses. In the year 2000 alone, more than 340,000 students were enrolled in classes directly connected to ATE grants. Countless others were taught by teachers who attended ATE workshops or used ATE-generated curriculum materials.

Across the nation, ATE grants are improving curricula with infusions of real-world tasks, critical thinking skills, and innovative teaching techniques. Students emerge from ATE-supported programs well prepared to perform complex tasks in the modern workplace.

Judith Ramaley, assistant director of the Education and Human Resources Directorate of the National Science Foundation, told a gathering of ATE grant recipients that their projects represent the nation's growth stock. This growth stock is powerfully influencing corporations, institutions, and individuals. Consider the following:

• Officials at Xircom, now a subsidiary of Intel, decided to stay in California when the California Regional Consortium for Engineering Advances in Technological Education (CREATE), funded by ATE, began turning out well-trained engineering technicians for the company to hire. There are 105 courses in the CREATE curriculum used by seven California community colleges. This cutting-edge curriculum blends academic and vocational material with industry skill standards.

• Jones County Junior College's (JCJC) enrollment grew by 1,200 students in two years with a new ATE-funded information technology (IT) program. Ninety percent of the college's IT graduates find work in their field immediately; some are recruited as early as the autumn before graduation. Such a large number of JCJC's IT graduates want to continue learning that the University of Southern Mississippi created an IT program to cater to them. In fall 2000, this baccalaureate program had 250 students.

"Don't underestimate your ability to change your world."—Keith Clay, principal investigator for the teacher preparation program at Green River Community College, Auburn, Washington

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• Doris Garcia, a Mexican immigrant student at Los Angeles Trade Technical-College, never thought she was good at math. But when a professor working on an ATE project told her about the opportunities available to people with technical degrees, Garcia was persuaded to enroll in higher-level math and science courses. To her delight, Garcia has learned that she is capable of understanding these challenging subjects. She will soon complete an associate degree in chemical technology.

Because ATE grants are in many instances the largest single source of money a community college receives outside its customary funding from state and local governments, colleges have an incentive to compete for them. The rigorous application process compels applicants to refine their thinking.

"Ours is like it is in the real world."—Jones Junior College student Crystal Dyess, comparing the troubleshooting in her classes with her friend's lessons at another college

In addition to the money, winning a grant places recipients within the ATE network, where some of the most innovative educators in the nation formally and informally exchange ideas. Speaking of the collegiality that typifies ATE conferences, Ellen Kabat Lensch says, "The sharing and the camaraderie is what is just amazing here, and it's not limited to discipline. There is a true sense if we help each other, we all rise higher." Kabat Lensch is director of the Advanced Technology Environmental Education Center in Bettendorf, Iowa. It was one of the first ATE centers funded in 1994.

HISTORY

More than 400 ATE grants have been awarded since the program began in 1994. Approximately $220 million had been distributed by the end of 2001. At the beginning of 2002, there were 12 centers of excellence and 200 projects receiving ATE funding from the National Science Foundation.

Centers of excellence are multicollege efforts that are intended to achieve broad, strategic improvements in particular disciplines of technician education such as manufacturing, biotechnology, and information technology. They typically receive $5 million over six years. ATE-funded projects focus on specific curriculum changes, professional development, and other aspects of technician education at particular community colleges. The average project grant has been about $400,000.

A major goal of the ATE program is to broadly distribute curricula and other educational products created by ATE centers and projects. NSF hopes that this dispersal of innovative instructional materials will encourage others to adopt and adapt the work of grant recipients.

The ATE program was the first congressionally mandated program at the National Science Foundation, which was itself created by Congress in 1950 as an independent U.S. government agency. NSF's mission is "to promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense."

In 1992, concern about the shortage of workers with technical skills and the potential negative effect of this shortage on the nation's economy prompted Congress to pass the Scientific and Advanced Technology Act authorizing the ATE program. The legislation stipulated that community colleges would lead the effort "to expand the pool of skilled technicians in strategic, advanced technology fields, to increase the productivity of the nation's industries, and to improve the competitiveness of the United States."

Community colleges have a long history of responding to local needs and working closely with business and industry. The ATE program solicitation strongly encourages community college faculty members who apply for the awards to include partners from business, industry, secondary schools, four-year colleges, and other two-year associate degree-granting institutions in the planning and execution of their ideas. So far, ATE grants have generated 15,000 collaborations, according to data gathered by the Evaluation Center at Western Michigan University.

"All the projects we saw really are phenomenal," says Frances

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Lawrenz, Wallace Professor of Teaching and Learning at the University of Minnesota, who is one of the Evaluation Center's researchers. "When we did the evaluation site visits I really was impressed with the quality of the work. We saw amazingly dedicated people putting in enormous amounts of effort." Lawrenz recognizes the immense challenge of improving the quality of technical education throughout the country. She believes that the ATE program is a good start to meeting that challenge because it provides "infrastructure improvements in the intellectual capital" of the nation.

For a summary of the Evaluation Center's findings, go to www.wmich.edu/evalctr/ate.

Jones County Junior College students Crystal Dyess (back) and Amy Janeen McCully talk with John Vos, Paducah Community College professor, at the 2001 ATE Conference in Washington, D.C.

VISION

Each of the ATE centers and projects started with an idea. Often the idea had been incubating in a professor's mind for a long time as a dream improvement he or she would make if only the college had the money. "It provides an opportunity to run with our ideas," explains Bill Hodgkinson, principal investigator for the 21st Century Urban Technical Education project that links Milwaukee Area Technical College's curriculum with a technical high school and a university. The project also connects students to apprenticeships.

In other instances, ATE grant applications started as potential solutions to problems within a discipline or an industry. For seven small community colleges north of Los Angeles, the problem was declining enrollments in computer and electronics classes and a poor job-placement rate for graduates in an area that is blanketed with high-tech companies. Deciding to cooperate rather than compete, the colleges formed CREATE, the California Regional Consortium for Engineering Advances in Technological Education. Aided by an ATE grant, the colleges worked together to overhaul their curricula and to start a faculty development program. Enrollment at the seven institutions has grown dramatically, and in 1999 CREATE's faculty development program won the national Hesburgh Award, sponsored by the Teachers Insurance and Annuity Association College Retirement Equities Fund. "One of the best benefits has been the [improved] morale of faculty," says Kathleen A. Alfano, principal investigator of CREATE.

Some of the colleges were already working on endeavors that were eventually funded with ATE grants, but the awards helped them achieve their goals more quickly or move their plans to a higher level. "With the NSF grant we went forward with strength," says Elaine Johnson, the director of the National Center for Biotechnology Education, which is known as Bio-Link. City College of San Francisco, which leads Bio-Link, would have had a program to improve biotechnology instruction even without the grant, Johnson says, but it would not have had the national influence that Bio-Link does.

One of the most distinguishing aspects of the ATE program is the passion that participants bring to their work. Ask an ATE grant recipient about what he or she is doing, and the conversation becomes decidedly one-sided. The person cannot talk fast enough. Listeners are shown photographs, handed brochures or informational CDs, or given a demonstration of the equiprnent used to educate students. This is not a sales pitch. The educators are simply excited about what they are doing, and they like sharing what

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they know. Their enthusiasm sustains them through the difficulties of doing groundbreaking work.

"Everyone in this room is doing this at some level as a labor of love," James Jacobs commented during an ATE conference as grant recipients nodded in agreement. Jacobs is associate director for community college operations for the Community College Research Center (CCRC) at Columbia University. CCRC has an ATE grant to analyze the institutional impact of the ATE grants. Part of the research, scheduled for release in fall 2002, will consider how ATE programs can be sustained after their NSF funding ceases.

For more information on the findings of the Community College Research Center go to www.tc.columbia.edu/CCRC.

Jacobs reports that the CCRC researchers, who visited 10 community colleges for their case studies, found that ATE grants have far-reaching effects. In addition to curricular changes and other educational outcomes, the grants can influence such institutional operations as bookkeeping procedures and hiring decisions. "ATE is a very, very significant program for community colleges, and it has been very helpful to many community colleges. And when it is used appropriately, it is a plus for community college development," he says.

Successful ATE programs are driven by a strong vision of institutional improvements that fit what a college's private-sector partners need, according to Jacobs. He notes that major industry involvement, community college administrative activities, and faculty collaborations operate on the basis of plans spelled out in ATE grants. With so much at stake, broad institutional support of a grant's goals is imperative. But it is not enough to craft grant applications as entrepreneurial pursuits: "It's not about the money; it's about the vision."

"If you do what you actually said you're going to do [on the grant application], you work really hard," says Lillie R.F. Crowley, a mathematics professor at Lexington Community College who has been the principal investigator for several ATE grants. "You have to be crazy to work that hard," she jokes. Crowley explains that she and her colleagues in the Kentucky Community and Technical College System keep tackling ATE projects because "it's an opportunity to make a difference."

MAKING A DIFFERENCE

ATE grants are igniting an education revolution that influences how people learn and improves how they work. The grants are particularly influential in cutting-edge technologies. The following programs are a sample of how ATE grants make a difference.

With its NSF grant, the National Center for Emerging Technologies at Bellevue Community College in Washington, developed the IT Skill Standards that businesses and trade associations now use to delineate information technology job skills and to assess job performance. More than 2,000 copies of the millennium edition of the standards were sold to corporations, educational institutions, and government agencies. An update of the standards was released in December 2001, and another is expected in June 2002. Julie Freeman, a member of the center's team, says creating the IT Skill Standards opened new doors with IT industry leaders like Microsoft. "It put us in a leadership role where we could work collaboratively." She adds, "It gave our college a national presence we never had before."

The Maricopa Advanced Technology Education Center (MATEC) in Tempe, Arizona, developed the first industry-wide skill standards for semiconductor manufacturing in conjunction with the Semiconductor Industry Association, its ATE center partner. "We wouldn't have attempted it without the NSF funding," says Michael Lesiecki, MATEC's principal investigator. The competencies identified in the skill standards are the basis for a modular curriculum that MATEC delivers electronically in customized packages to colleges and businesses. Students use computer simulations of processing equipment for experiments. Faculty receive electronic support as well as access to a MATEC clearinghouse. Sales of instructional materials now provide a significant portion of the center's funding.

Bio-Link, the National Center for Biotechnology Education, offers free frequently updated professional development materials and tech-

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Ibrahim Mustafa Ekin, a multimedia programming and design student at the Borough of Manhattan Community College, presents his work at the 2001 ATE Conference.

niques for improving student learning on its Web site. As the principal investigator for Bio-Link, Elaine Johnson has been asked to sit on national committees where she has influenced decisions about biotechnology policy. "We're educating industry about community colleges," Johnson says, noting that many of the business leaders with whom she has talked had previously hired only people with bachelor's degrees and above. Many of them are now hiring associate degree holders.

Since 1996 the Southeast Advanced Technological Education Consortium, based at Nashville State Technical Institute, has worked directly with 200 college instructors, teaching them how to use case studies in their lessons, according to Sydney Rogers, the center's principal investigator. Rogers estimates that the center's promotion of case-based instruction has indirectly affected 1,000 other community college educators. "I've seen this huge growth in them. Five years ago all they knew was how to stand up in front of the class and lecture," she says. Using case studies to teach technical skills makes it easier for students to transfer knowledge from one situation to another on the job: "We can actually affect how adaptable and changeable our graduates are."

The Northwest Center for Sustainable Resources, based at Chemeketa Community College in Oregon, used its six-year, $5 million grant to develop an environmental science curriculum that encompasses forestry, fisheries, wildlife, agriculture, and geographic information systems. Six community colleges in the Pacific Northwest were involved in creating the new curriculum; five others were test sites for the new courses. "This grant has really helped us to blossom, to move forward incredibly," says Susie Kelly, the center's project director. "It has added dimensions so students are getting a better education." She adds that students emerge from the revamped program with a much greater understanding of biology and ecosystem management. Because of NSF's support, the center is able to provide its curriculum and training materials to educators free. "We like to give the taxpayer money back to the educators," Kelly says.

The process control pilot facility built at Alabama Southern Community College with ATE funds is a boon to the college, its students, and processing companies. The facility's state-of-the-art equipment has become an effective recruitment tool for the rural community college, according to Christine Prout, the principal investigator at the Center for Excellence in Forestry, Paper, and Chemical Technology. Students enrolled in the college's Pulp, Paper, and Chemical Technology program not only get experience using sophisticated equipment, but they are also eligible for scholarships, paid internships, and full-time jobs with 14 companies assisting with the center. Industry is gaining, too, by having a more ample supply of competent technicians.

HOW THE GRANTS ACCOMPLISH SO MUCH

As significant as the monetary awards are, the ATE grants accomplish much more than dollars alone might predict. The grants have a multiplier effect because the businesses and industries that become partners in centers and projects donate their expertise and services. The Evaluation Center estimates that ATE programs have received $14 million in monetary donations and $16 million from in-kind contributions. In many cases, NSF funds also serve as seed money that attracts additional financial support from government programs, corporations, and philanthropical organizations.

Principal investigators describe the multiplier effect of the ATE grants as one of the most gratifying aspects of winning an award. They note that the National Science

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Foundation's prestige gives their efforts a credibility they would not otherwise have. The grants act as catalysts for galvanizing support within the academic community and attracting business and industry partners. The coalitions of educators and businesspeople provide a range of assistance that helps grant recipients accomplish their goals. This record of performance is then used by most principal investigators to secure more funding from other sources. ATE conferences and the communication that NSF encourages among grant recipients have frequently fostered other multidisciplinary endeavors.

PRESTIGE

After educators at CUNY-Borough of Manhattan Community College (BMCC) won an ATE grant, the New York State Department of Education approved the project's curriculum for Multimedia Programming and Design in weeks rather than the usual months. Mary Alice Cohen, the principal investigator and computer information systems professor at the college, reports that only a few months before the curriculum was approved, City University of New York professors questioned whether teaching students how to make computer-based interactive products was "a viable college-level curriculum." The program, which combines art, music, computer, and communications classes, is now considered a separate and unique part of the college's offerings.

Cohen thinks a few grants made the critical difference in winning curriculum approval. First, the multimedia program was selected by the American Association of Community Colleges (AACC) and Microsoft to participate in the Working Connections mentoring program, which provided advice, $270,000 in grants, and $1.5 million in software. The progress made with this grant helped BMCC win the ATE grant to help it develop the new multimedia curriculum. Since then the program has received a $400,000 grant from the Fund for the Improvement of Postsecondary Education (FIPSI) and a $300,000 grant from the Minority Science Engineering Improvement Program, both from the U.S. Department of Education.

Just a campus visit by an NSF-funded mentor can help a fledgling program. "Everybody's willing to believe an expert," says Tora Johnson, an adjunct professor at Cape Cod Community College who is developing the Geographic Information Systems (GIS) curriculum there. Gail Hobbs, a Pierce College geography professor and principal investigator of an ATE grant, visited the Massachusetts campus on behalf of AACC's MentorLinks: Advancing Technological Education program. In addition to pointing out how GIS could be used by students to map a campus arboretum during her visit, Hobbs was the featured guest and speaker during meetings with the college president, faculty, and business leaders. According to Johnson, "An important thing was getting the minds of the college thinking about the technology, and we have that much more because of Gail's visit." Since the visit, college administrators have agreed to set aside space in a new technology building for a GIS lab and classroom.

LEVERAGE

Vincent A. DiNoto, director of IT Fast-Track, said the first ATE grant that the 28-college Kentucky Community and Technical College System received with Lexington Community College helped attract additional funds at a rate of more than 3 to 1. IT enrollment also grew from 50 students to 597 in three years.

The success of this ATE grant led to statewide participation in Working Connections, a Microsoft-funded grant that provided $300,0000 and software with a retail value of $10 million to a free certification program that teaches computer operation and repair skills to low-income people. Those who complete the program get to keep their computers. This new IT curriculum helped the Kentucky system win an ATE grant for a regional IT center and another grant to support professional development for secondary and postsecondary educators throughout the state. In 2001, the system received two more ATE grants. One will be used to adapt and implement the SCANS (The Secretary's Commission on Achieving Necessary Skills) skills that were developed at Johns

Hopkins University with NSF support; the other will help the colleges implement the South Carolina ATE model for developing college-level academic skills among disadvantaged college freshmen. "It's taking our curriculum to where we could not really have gone on our own," DiNoto says of the ATE funding.

Catherine Perry Cotten, the principal investigator at Jones County Junior College in Ellisville, Mississippi, says that when the college won its first ATE grant, which it used to create the Network Training for Educators program, it seemed that every employee promoted the program because they were so proud. "The publicity gave the college a lot of credibility," she reports. Overall college enrollment grew by 1,200 students in two years. Recruiters now come to the campus each September to hire students who will graduate from the IT program the following May. "Because of this grant we've leveraged six million more dollars from other sources," Cotten adds.

"We get experience at a national lab we otherwise would not have had."—Daniel Westfall, a student at SUNY-Alfred State College who was able use the visualization theater at Brookhaven National Laboratory in Long Island to make three-dimensional models of tomography data

BUSINESS PARTNERSHIPS

"Industry is clever in different ways from community colleges," says Kathleen Alfano, the principal investigator of CREATE. She cites the leadership of Aerospace Dynamics International (ADI) as a prime example of the contributions businesses make to the success of ATE grants. ADI is a partner of the College of the Canyons in Santa Clarita, California, one of seven community colleges involved in CREATE.

ADI donates 2,500 square feet of space at its manufacturing facility in Santa Clarita for the college to use for classes. Eighty companies, including some of ADI's competitors, have sent employees to this space for training, says Dena Maloney, dean of economic development at the College of the Canyons. ADI also asked that $75,000 of its "use tax"—a California tax on equipment purchased out of state—go directly to CREATE for equipment. "Because the project had such an impact on the industrial base of the community, the city council was willing to do it," Maloney says. ADI's collaboration with the College of the Canyons won the statewide Business Partnership of the Year award, given by California's community college chancellor, in 1999.

An ATE grant enhanced the relationship between the semiconductor industry and the Maricopa Advanced Technology Education Center (MATEC) in Arizona. The Maricopa Community College District had been working on local issues with SEMATECH, a precompetitive semiconductor manufacturing research and development consortia, before receiving an ATE grant in 1996 to create MATEC. At the urging of Cathleen A. Barton, who ran a SEMATECH program to build the technical workforce, MATEC adopted a national focus and put representatives from semiconductor companies from across the country on its advisory panel.

Barton, who is now with the Semiconductor Industry Association, is co-principal investigator of MATEC's ATE grant. She says, "A key component of the technician partnership strategy was to ensure that we had relevant curriculum and trained faculty, which was MATEC's charter. And so began a hand-in-glove relationship." MATEC also embarked on a national advertising and marketing effort to attract students.

"Because of the model of national collaboration with both semiconductor companies and colleges across the country for curriculum and faculty development, as well as skill standards, the work MATEC does is viewed as highly collaborative with strong support and buy-in. It is viewed as *the* place for core curriculum and development," Barton responds when asked about the genesis of this remarkable partnership. The skill standards in

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MATEC's curriculum influence the expectations that semiconductor companies have for technicians because they are "thorough, accurate, and well-developed, and vetted by both industry and college partners."

Along the Gulf Coast, an ATE grant has transformed training for the petrochemical and refining industry by funding the creation of guides used to train process technicians in programs that lead to associate degrees in applied science. The guides are now in use at community colleges in Texas, Louisiana, Montana, Mississippi, Oklahoma, Illinois, Kentucky, New Jersey, Alaska, New Mexico, and the Virgin Islands. "Everybody's using our material. Our material applies anywhere around the country [because] a pump is a pump," says Steve D. Ames, president of the Gulf Coast Process Technology Alliance and a process training coordinator for ExxonMobil's facility in Baytown, Texas.

"It's just fascinating...[In] the classes I was taking [before], I never felt like I was geared to a career. This introduced me to all sorts of options."—Amy Fitch of her courses at the College of DuPage

The widespread use of a standard curriculum based on industry practices is an amazing, rapid advance in the petro-chemical field. According to Ames, when representatives of the 260 companies with processing facilities along a 100-mile stretch of the Texas Gulf Coast first met in 1995 to discuss high attrition among their workers due to retirements, they wanted to solve a local problem. As these businesspeople talked with community college educators about their need for "a technician of the future to keep competitive with overseas," they learned that each college had its own training methods that did not even use the same terms for identical operations.

The companies formed the Gulf Coast Process Technology Alliance and began working with several community colleges to draft skills-based course descriptions. A state Perkins Grant paid for the initial steps in developing eight core courses. Then, in 1999, the College of the Mainland won a $900,000 ATE project grant to create a Center for the Advancement of Process Technology. With advice from industry experts, educators used the NSF money to write instruction manuals for the eight new courses. A $921,000 Department of Labor grant was used to recraft the information for the Internet. "Without these grants, the [curriculum] standards would not have happened so quickly," Ames says. Funds generated by the Web-based courses and manual sales will help cover the costs of keeping the materials up to date.

The successful collaboration between the alliance, representing the major petrochemical and refining industries, and 23 community colleges and universities, as well as business and government, is a model others are using. "We're bringing people in from all over the country," Ames reports. In Alaska, for instance, petroleum companies and unions formed the Alaska Process Industry Careers Consortium in 1999 to train replacements for retiring pipeline workers. Less than six months after its first meeting, the consortium had courses based on the process technology center's curriculum in place at three University of Alaska campuses.

NETWORKING

Winning an ATE grant makes grant recipients part of the ATE network, a resource that many participants consider one of the unquantifiable bonuses that come with the grant money. NSF expects all grant recipients to respond to questions about their programs, and provides contact information including phone numbers, addresses, and e-mail addresses for every ATE center and project. The informal network is nurtured at annual ATE conferences for grant recipients, which AACC organizes with support from NSF.

Michael Lesiecki, MATEC's principal investigator, describes these cordial gatherings as unique academic meetings. He contends that information is more easily exchanged at these conferences than at other college conventions because everyone has had the experience of writing a

successful ATE grant proposal. "The shared desire to instigate innovations and to improve technological education," Lesiecki says, "creates a connection among people from different disciplines and different parts of the country. People are not so intent on talking about what they did as on what they can do together."

After attending her first ATE conference in October 2001, Lynn Fowler, an associate professor of biochemistry and biotechnology at Clinton Community College in Plattsburgh, New York, comments, "Meeting with everyone helps us share common experiences and learn different approaches."

NSF AS PARTNER

Many recipients liken NSF's ATE grants to venture capital. But unlike business investors who give money and watch from a distance, the foundation's program officers are equity stakeholders who keep in touch with the educators who receive grants.

Beginning with the comments that grant readers write about proposals, NSF staff members try to encourage innovations that are based on realistic, clear thinking. They look for a track record of accomplishment and persistence among grant applicants. Recognizing the complexity of creating innovations, the foundation's staff tries to balance grant recipients' need for flexibility with taxpayers' need for accountability.

"I like to talk about NSF as a partner, because they have been there, I mean through thick and thin. And sometimes they speak loudly at us, but they are always very, very supportive and excited about what they do and what we are doing," says Ellen Kabat Lensch, director of the Advanced Technology Environmental Education Center. ■

Phone Call Has an Environmental Impact

The first time Jeffrey Steinfeld called Ellen Kabat Lensch at the Eastern Iowa Community College District office, she thought it was a prank.

"It was three years ago, and I'll never forget the day my phone rang. I picked it up. It was Professor Jeffrey Steinfeld at MIT," Kabat Lensch recalls. "At first I thought, 'I wonder if it is one of my friends playing a joke on me.' And I started talking to him, and he said, 'You know, I'm not very good at this. I've never talked to someone at a community college before.' And I said, 'I'll be real honest with you. I usually don't get phone calls from MIT.'"

A lot of phone conversations have taken place since then. The Massachusetts Institute of Technology and the Advanced Technology Environmental Education Center (ATEEC) that Kabat Lensch directs have built a partnership that bolsters community college environmental technician courses and high school science classes with MIT's environmental research.

Since receiving NSF funding for the partnership in October 2000, ATEEC has used MIT data and case studies to create curriculum modules on epidemics, groundwater pollution, air quality monitoring, and the detrimental effects of a gasoline additive.

The ATEEC-MIT partnership sponsored a critical issues forum at which university researchers, community college faculty, environmental practitioners, and business and industry representatives developed strategies for exchanging environmental information.

This partnership may also become a model for other community college-based ATE centers working with research universities.

When Steinfeld visited NSF to explore the foundation's interest in funding a plan to distribute MIT's environmental research findings, everyone else had left the room before Hal Richtol suggested that he call Kabat Lensch. "Well, I was

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ATE Changes Students' Lives

MATE Center students test the underwater vehicle they designed and built as part of the Introduction to Submersible Technology course, taught at Monterey Peninsula College.

Testing a chemical technician curriculum is doing far more than teaching the scientific method to Los Angeles Trade-Technical College students: It is changing their worldviews.

"They like the idea that they are doing something that another group of students also did in another state, and that the ultimate goal is that these labs will be distributed throughout all of the United States for any community college to adopt," explains Renee Madyun, a professor in the chemical technician program at L.A. Trade-Technical College.

Madyun's students are doing the beta (second-round) tests of the Contextual Laboratory Curriculum for Chemical Technicians (C3T) developed at Athens Technical College (ATC) in rural Athens, Georgia. This six-module curriculum utilizing real-world chemical systems was developed by two-year and four-year college faculty members with advice from industry consultants. Through an ATE project grant, NSF supported the curriculum development and its testing at ATC and L.A. Trade-Technical College.

Madyun's students are particularly excited "that they actually were part of the whole big picture, that they are not just kids who live in this little box called South Central anymore. They are part of the world."

Their enthusiasm was so strong that Madyun decided to organize a camping trip so they could collect freshwater and saltwater samples in the field. Their NSF funding covers the cost of industry-standard testing procedures, but the students raised money to pay for their tents and other camping equipment. For many participants it was the first time they had been out of an urban environment. Students worked in teams, as most workplaces require, while they experienced nature.

"You see the ramifications here. This is not..."—Madyun pauses as her voice fills with emotion—"this is not just about chemistry. This is about education improving lives."

Throughout the nation, ATE projects are making powerful, positive impressions on community college students' lives. With six months until graduation, Dean Khalidy says that the classes he has taken at Monterey Peninsula College in Monterey, California, headquarters of the NSF-funded Marine Advanced Technology Education Center (MATE), have already improved his life. "It's complete instant gratification."

Khalidy returned to college at 37 after a fishing buddy, who had been listening to Khalidy complain about his job as a bartender at a five-star resort, told him about a newspaper story on the remotely operated vehicle (ROV) classes that are part of the Marine Science and Technology program at Monterey Peninsula College.

Khalidy took business courses at two universities when he was in his 20s, but he has found the hands-on assignments at Monterey much more engaging. "You're on the boats and into the field. I just can't say enough about it." When he graduates, Khalidy hopes to do hydrographic surveys for oil or gas companies, or work for a coastal environmental agency. During a summer internship he studied bioluminescence from a University of Miami research vessel in the waters off New England.

Tending bar is lucrative, Khalidy says, but "not rewarding. It's destructive. With this you see a lot of positive influences and ramifications."

Debbie Hanninen, in her second year of the teacher preparation program at Green River Community College (GRCC) in Auburn, Washington, also had a midlife yearning for a meaningful career. "In my 40s, I realized money is not quite as important as I thought it was in my 20s."

Hanninen enrolled at GRCC to become a classroom paraprofessional, and got a surprise: the emphasis on science and math in her required courses got her excited about teaching science, which is now her goal.

Renee Madyun, chemical education professor at L.A. Trade-Technical College (left), with her student Doris Garcia at the 2001 ATE Conference in Washington, D.C.

The NSF has granted funding to Green River's Project TEACH (The Teacher Education Alliance of College and High Schools) since 1998. The college is working on a model to recruit and retain talented teachers, to provide more early field teaching experiences, and to improve children's math and science instruction by strengthening the content of the math and science courses that are taught to future teachers.

The use of manipulatives and inquiry-based teaching in the college's courses for education majors has made all the difference to Hanninen. "It just has totally changed the way I see the world. And I couldn't tell you anything I learned in high school science. I just took the test and forgot it," she says. "This was just so powerful. I love it and there's a need [for science teachers]."

Doris Garcia began considering a science-based career after Madyun spoke to an L.A. Trade-Tech math class about the chemical technician program. Garcia had not taken any advanced science classes in high school, but was persuaded by Madyun's encouragement that science "is not as hard as it looks." After working through the C3T modules taught by Madyun, Garcia is so enthralled with what she's learning that she is considering teaching after working for a few years as an industrial chemical technician.

"She just makes it so much fun you want to keep learning," Garcia says of Madyun. "I would like to be an inspiration like she has been to me." ■

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intrigued," Steinfeld says, remembering that he thought, "What the heck. Let's give this a try." He is glad he followed Richtol's advice: "It [the partnership] has given us a vehicle to start delivering that research to a much broader audience. It has given credibility to the idea that you can get funding from NSF to engage in this broader education and outreach."

Disseminating the latest scientific information is of paramount importance to Steinfeld, a chemistry professor. He and his MIT colleagues have worked for several years on the Alliance for Global Sustainability with researchers at the University of Tokyo and the Swiss Federal Institutes of Technology. They have been frustrated that what they have learned has not greatly changed the environmentally hazardous practices of industries or individuals.

"The biggest challenge is whether our society can reach a sustainable arrangement with our environment," Steinfeld says. "I cannot tell you what the outcome of our experiment will be, but we have only one chance to get it right. The best strategy we have come up with is to educate the next generation." He adds that in order to accomplish this goal, MIT's researchers have to reach beyond the university's 1,200 undergraduates.

Community colleges provide a large potential audience and a reality check for the researchers because their faculties work closely with industry and are well connected to their communities.

Steinfeld has gained an appre-

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iTEC Adds Soft Skills to Best of Breed IT Curricula

The bottleneck between jobs and workers created by the shortage of qualified information technology instructors is not unique to Florida's high-tech corridor. The solution that three community colleges, two universities, and industry and government came up with, however, is.

They formed the Information Technology Education Center (iTEC), based at Daytona Beach Community College in Florida. The center supplements the best industry certification programs, which iTEC refers to as "Best of Breed," with Teach the Teacher (T3) instruction.

The community college instructors who go through iTEC's workshops receive instruction for certification in programs like A+, Java, and Mous, and pedagogy for presenting the new software and incorporating soft skills like teamwork and problem solving in their college courses.

Since it received NSF funding and began offering classes in spring 2000, the ATE center has trained 210 faculty members from 13 community colleges and three county school districts. Center officials estimate that over 4,000 Florida IT students have benefited from their instructors' iTEC training. iTEC's leaders hope to reach educators throughout the state and eventually to influence IT training throughout the Southeast. The center has also established associate of science degrees with integrated industry certifications for computer networking.

"Faculty are our customers," says iTEC principal investigator Robert Williams. "We hire the best certified trainers money can buy, and at community college faculty members' convenience, hold workshops."

Initially, the center experimented with incentives like free classes and travel stipends. Williams has learned that because community college instructors are so passionate about their teaching, it is of paramount importance to schedule training sessions during semester breaks. He hopes the center will someday offer workplace training and sustain itself with programming revenue.

iTEC's leaders decided to use industry-created curricular materials because they are high quality and are updated with each new version of a software program. The traditional curriculum development process that relies on university professors to create courses and write textbooks is simply not quick enough to keep up with changes in high-tech industries, Williams reports.

"We contract with IT faculty who have expertise in the respective area to identify top-quality materials for each subject," Williams says, explaining how "Best of Breed" is determined. One of the first criteria for material selection is that it has been authorized or certified by the appropriate organization for use in learning the competencies associated with the certification exam.

"From the remaining set of resources, the faculty member then looks for excellence of publication, pedagogy, and suitability for college-level learning," Williams explains. "In most cases we suggest both primary and supplementary texts and online resources. In some cases we are sharing supplementary materials developed by faculty who attend our center and which improve the development of soft skills along with the technical learning. These types of skills can be developed though various exercises, such as collaborative learning experiences where the students work in teams on projects, and case study projects where the student has to work within the constraints of certain business issues while also solving technical problems."

In addition to the certification course, iTEC extends its training to cover issues related to teaching the course to others. For this and other aspects of its work, iTEC has built on the accomplishments of the National Workforce Center for Emerging Technologies (NWCET) at Bellevue Community College in Washington. This center was one of the first to receive an ATE grant, which it has used to create IT Skill Standards and to develop innovative ways of delivering IT training.

Just as the NWCET works with Microsoft Corporation and other Washington-based high-tech companies, iTEC works with the Florida High Tech Corridor Council, a consortium of government, education, and business. Approximately 5,200 high-tech companies employ 160,000 people across central Florida from Tampa Bay through Orlando to Daytona Beach.

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The council laid the groundwork for iTEC and was instrumental in its creation. "We are five years ahead of where we would have been if the council had not been there," Williams says. The center's educational partners include Seminole Community College, Valencia Community College, the University of Central Florida, the University of South Florida, and the public school systems of Volusia, Seminole, and Flagler counties.

One of the most significant aspects of iTEC is that it is led by an individual with industry experience. Robert Williams got his start in computer science as a student at Daytona Beach Community College. In the 1980s he was a member of IBM's PC development team, and in 1990 he became a founding member of a software start-up known as Citrix Systems. The company went public in 1995 and currently employs 1,500 people worldwide and has over $4 billion in market capitalization.

Williams retired from Citrix in 1997 and began his second career. He returned to Daytona Beach Community College as a faculty member and chairman of the computer and engineering technology department. "I am very fortunate to be able to serve in a way that helps give others the exciting career opportunities in technology that I have had. The National Science Foundation has allowed me to broaden the impact of my efforts beyond my college, and for this I am very grateful," Williams says. ■

iTEC Comes to the Rescue

The Information Technology Education Center (iTEC) rescued Gloria Paproski from a thorny problem.

The grant that funded her new Computer Engineering Technology program at Lake-Sumter Community College (LSCC) in Leesburg, Florida, where she is an instructor of computer networking technologies, would pay for training in Microsoft NT 4.0. Unfortunately, about the time the program was approved by the state, Windows 2000 track for MCSE certification was launched. The $1,500 LSCC instructors get a year for professional development is a fraction of what the new certification training costs, Paproski explains.

"Being a small school in a rural area, there are no large corporations to partner with. Local governments, school districts, small businesses are in need of trained personnel but also have very small training budgets. With the tourism crunch in Florida, the legislature has cut the college budget so the future for training dollars doesn't look very bright either," she says.

Then Paproski learned iTEC provided the training for free with its ATE grant. She signed up immediately for the first Windows 2000 course. "The incentives offered are great, but not my motive for taking courses. I have taken advantage of the [state] grant paying for hotel accommodations to prevent me from having a two-hour commute each way." Paproski uses the extra hours out of traffic to study.

Paproski likes the Teach the Teacher (T3) format, which presents information from the perspective that instructors will have when they return to their campuses. "We talk about ways of presenting the material, how to structure the labs to our facilities, etc. Running through the labs the students will do really helps with putting a course together and finding the errors and problems students will run into."

"This has made a big difference to my students," she explains. "I know that I would be struggling desperately if it were not for iTEC. The courses give me the confidence to present the course for the first time to my students because a group of us have found the problems and worked out the best ways to set up the class labs."

Paproski's students share her excitement about iTEC. "They know that I, too, am a student. I come back excited about courses to come, and that motivates them to keep at the task, and that motivates me to keep studying."

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Mentorships Advance Community College Innovations

Gina Mounfield, a computer software specialist by training, thinks of herself as a conduit in a small but growing network of mentors among community college technologists. She and a dozen other participants in this network gathered in Washington, D.C. on October 3–4, 2001, to talk about their experiences with formal mentoring programs and to assist AACC in its efforts to foster these working relationships. The meeting was held in conjunction with the National ATE Principal Investigators Conference, which was co-sponsored by AACC and the National Science Foundation.

"I can't tell you how valuable this process has been," says Mary Jane Curran, coordinator of the environmental technology program at Cape Cod Community College in Massachusetts. She attributes new administration support for geographic information systems (GIS) workshops for public school teachers and students' mapping of a campus arboretum to a campus visit by mentor Gail Hobbs, a geography professor at Pierce College in Woodland Hillls, California.

"We just kept [Hobbs] talking all day and wrote down everything she said," explains Tora Johnson, the adjunct professor of environmental technology who is developing Cape Cod's GIS curriculum. "She took the material I had been working on to a higher level."

Other professors at the network gathering reported that their mentors had increased the visibility of their technology programs, improved their colleges' connections with industry, clarified their thinking about potential new programs, and helped them evaluate the performance of existing programs.

But not just those who receive advice benefit from mentoring. "Very often, answering somebody else's question makes me think about how we answer those same problems in our college," says Joy McMillan, associate dean of Madison Area Technical College in Wisconsin. She served as a mentor to two colleges: Clinton Community College in Plattsburg, New York, and the Community College of Southern Nevada in Las Vegas.

"Meeting with everyone helps us share common experiences and learn different approaches."—Lynn Fowler, associate professor of biochemistry and biotechnology at Clinton Community College, speaking about her first ATE conference

Workshop participants also expressed positive support for the MentorLinks: Advancing Technological Education program.

AACC plans to expand the mentoring program to 10 colleges with a new round of funding in 2002. The grants, which will average about $7,500, pay for mentors to travel to their advisee's college, and for other professional development expenses.

"There is great value, that we see and that their mentors have talked about, in the networking and sharing of ideas," says Lynn Barnett, AACC's vice president of academic, student and community development.

As Gina Mounfield explains, the contacts made while mentoring build in overlapping layers that lead in extraordinarily productive directions. Her "multigenerational" experience in mentorships illustrates the synergy that is possible when more experienced educators intentionally share their professional experiences with other faculty in one-on-one meetings and through correspondence.

For several years, Mounfield, who was recently promoted from chairman of the IT department at Midlands Technical College in Columbia, South Carolina, to vice president for career projects, has been the grateful recipient of advice from her mentor, Gordon Snyder, an instructor at Springfield Technical Community College in Massachusetts. Snyder is a computer hardware specialist who heads the Northeast Center for Telecommunications Technologies, an ATE center of excellence at the college. Mounfield and Snyder were paired by Working Connections, an AACC program supported by Microsoft to encourage information technology careers among underrepresented student

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populations.

Given the success of her experience and with Snyder's encouragement, Mounfield successfully applied to become a mentor herself in the pilot MentorLinks program. Since October 1999 she has served as a mentor to Chaffey Community College in Rancho Cucamongo, California.

When Mounfield went to the college for a site visit, Snyder went along, too. Now faculty at Springfield and Chaffey are working together on another NSF project.

Many of the advancements at the three institutions, including the creation of new technology centers at Midlands and Chaffey, would not have happened without the exchange of ideas and experiences that occurred because of these formal mentorships, Mounfield believes. "It definitely would not have happened at our college. We would not have known where to start."

While it is clear that those in the mentoring program hit it off personally, the mentoring relationships do not rest solely on friendships and have survived personnel changes at the colleges.

Janice Padula, science division chair at Clinton Community College, credits Joy McMillan's persistence in continuing the mentorship after Clinton's initial project director left the college. The institution's recent commitment to new biotech courses continued with new leadership and McMillan's support.

"Without the grant, Lynn probably never would have been hired," Padula says of Lynn Fowler, who was recently hired as associate professor of biochemistry and biotechnology at the upstate New York college.

"It's not just me. It's not just Janice. There is merit in what you see going on in the organization," McMillan says. ■

MENTORLINKS

For further information about this program, go to www.aaac.nche.edu/ateprogram.

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ciation for community colleges since making that first call to Kabat Lensch. She, in turn, admits that she has discarded notions about researchers being isolated in ivory towers. She now sees Steinfeld and his colleagues as practical people who have rolled up their sleeves to deal with serious world problems.

Figuring out how best to work together and use each other's strengths has taken time. Steinfeld and Kabat Lensch got a hint of how much more they could accomplish as a team when they went together to NSF's office in Washington, D.C.

Instead of meeting with three program officers, as Kabat Lensch has with other grants, or getting the polite but lukewarm reaction that Steinfeld had gotten months earlier, the two found that more than 20 NSF staffers attended their presentation.

"They are almost more excited about this than we are," Kabat Lensch says. Given her and Steinfeld's enthusiasm for their program, that may not be possible, but the presentation was a propitious beginning. ■

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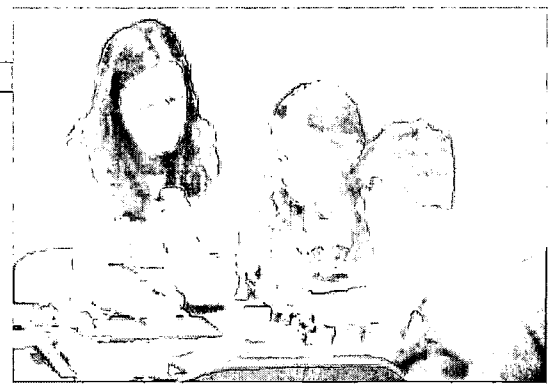
Teacher Preparation



Katie Lymangrover, a graduate of the Project TEACH program at Green River Community College, tutors fourth grade students in math.

Community colleges are playing a critical role in solving one of the country's most pressing problems: the shortage of qualified teachers who will be needed to replace the two million educators expected to retire during the next decade.

Although 40 percent of teachers nationally begin their post-secondary studies at community colleges, the role of these institutions in helping to resolve the teacher shortage crisis was overlooked until relatively recently.

In 1998, the National Science Foundation convened a conference on the teacher shortage. The report, *Investing in Tomorrow's Teachers: The Integral Role of Two-Year Colleges*, documents the results of this conference and highlights teacher preparation programs. NSF has added teacher preparation as an option in its ATE program.

"We like to support things that are difficult to have happen, because we know it may take extra support," says Joan T. Prival. Prival is the lead program director for teacher preparation in NSF's Division of Undergraduate Education, which funded eleven projects in the 2001 fiscal year.

The projects focus on improving the math and science training that prospective teachers get in the foundation courses they take at community colleges before transferring to four-year colleges for certification.

NSF expects that these ATE projects will expose prospective teachers to the uses of technology in the workplace, so that they will in turn be able to share real-world technical experiences with their students. This aspect of the program adds value to community colleges' teacher preparation; it is over and above what is done at most four-year colleges.

The teacher preparation projects and other ATE grants educate incumbent teachers through in-service training. In addition to recruiting new teachers, some of the projects strive to retain experienced professional teachers.

Here is what some of the first recipients of teacher preparation grants are doing:

• Green River Community College's (GRCC) Project TEACH offers math and science inservice programs for current teachers in all grades. It also established a center whose director coordinates inservice and preservice programs among six school districts in western Washington. As a participant in NSF's Science, Technology, Engineering and Mathematics Teacher Preparation program, GRCC several years ago started Teachers of Tomorrow Clubs at high schools and developed a program to recruit and advise potential teachers among its own students. The yearlong interdisciplinary science course and math sequence for future teachers that GRCC developed with Central Washington University already serves as a model for other colleges.

• Kingsborough Community College's Crossing Boundaries project links members of the college's science and education departments with professors at Brooklyn College, where nearly half of New York City's teachers have taken classes. Instructors at the two institutions are working together to revise their science curricula and create Web-based modules. They are also developing an online advisement program for use by their diverse urban student population. As a result of these efforts to immerse prospective teachers in science, students here completed early field experiences at the Jamaica Bay Wildlife Preserve, the Brooklyn Botanic Garden, the American Museum of Natural History, and the New York Aquarium.

• Prince George's Community College (PGCC) is leading an effort by all of Maryland's community colleges to revise the three math and three science courses that form the core of a new Associate of Arts in Teaching degree. This unique two-year degree program includes all the math and science courses required for elementary teaching certification and transfers to any four-year college in Maryland. The Maryland

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ATE Grantee Institutions by State

STATE	ATE GRANTEE INSTITUTION
AK	Ilisagvik College
AK	University of Alaska Southeast Juneau Campus
AL	Alabama Southern Community College
AL	Gadsden State Community College
AL	Jefferson State Community College
AR	Westark College
AZ	Maricopa County Community College District
AZ	Pima County Community College District
CA	California Polytechnic State University Foundation
CA	City College of San Francisco
CA	College of the Desert
CA	Cuesta College
CA	Cypress College
CA	Evergreen Valley College
CA	Foothill College
CA	Glendale Community College
CA	Los Angeles Trade-Technical College
CA	Monterey Peninsula College
CA	Moorpark College
CA	Mount San Antonio College
CA	MPR Associates
CA	Pasadena City College
CA	Peralta Community College District
CA	Southwestern College
CA	University of California-Davis
CA	Yuba College
CO	Colorado State University
CO	Community College of Aurora
CO	Mesa State College
CT	Capital Community College
CT	CT College of Technology
CT	University of Connecticut
DC	American Association for the Advancement of Science
DC	American Association of Community Colleges
DC	American Chemical Society (ACS)
DC	Conference Board of the Mathematical Sciences
DC	Mathematical Association of America
DE	Delaware Technical and Community College Stanton-Newark Campus
FL	Brevard Community College
FL	Daytona Beach Community College
FL	Florida State University
FL	Hillsborough Community College
FL	Santa Fe Community College
FL	Seminole Community College
FL	University of Central Florida
FL	Valencia Community College
GA	Athens Area Technical Institute
GA	Gainesville College
GA	State University of West Georgia
HI	University of Hawaii-Manoa
IA	Hazardous Materials Training and Research Center/Eastern Iowa Community College District
IA	Indian Hills Community College
IA	Iowa State University
IA	Kirkwood Community College
IL	College of DuPage
IL	Joliet Junior College
IL	Moraine Valley Community College
IL	Northern Illinois University
IL	Rock Valley College
IL	Southern Illinois University at Carbondale
IL	University of Chicago
IL	University of Illinois at Chicago
KY	Kentucky Community and Technical College System
KY	University of Kentucky Research Foundation
MA	Berkshire Community College
MA	Bristol Community College
MA	Cape Cod Community College

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ATE Grantee Institutions by State CONTINUED FROM PAGE 17

STATE	ATE GRANTEE INSTITUTION
MA	Concord Consortium
MA	Consortium for Mathematics and Its Applications Inc.
MA	Education Development Center
MA	Greenfield Community College
MA	Mount Wachusett Community College
MA	New England Board of Higher Education
MA	Springfield Technical Community College
MA	TERC Inc.
MA	Woods Hole Oceanographic Institution
MD	Accreditation Board for Engineering and Technology Inc. (ABET)
MD	Allied Technology Group
MD	American Institute of Physics
MD	Community College of Baltimore County, Catonsville
MD	Community College of Baltimore County, Essex
MD	Johns Hopkins University
MD	Prince George's Community College
ME	Partnership for Environmental Technology Education
MI	Henry Ford Community College
MI	Mott Community College
MI	Traverse Bay Area Intermediate School District
MI	Wayne State University
MN	Global Wireless Education Consortium
MN	Lake Superior College
MN	Minneapolis Community and Technical College
MN	Minnesota State Colleges and Universities
MN	University of Minnesota-Twin Cities
MS	Jones County Junior College
MS	Mississippi Delta Community College
MS	Phi Theta Kappa
MT	Fort Peck Community College
NC	Carteret Community College
NC	Regional Technology Strategies
NC	University of North Carolina at Chapel Hill
NC	Wake Technical Community College
ND	Bismarck State College
NE	Applied Information Management (AIM) Institute
NE	Southeast Community College
NH	New Hampshire Technical College at Berlin
NJ	Bergen Community College
NJ	Middlesex County College
NM	New Mexico State University
NM	San Juan College
NM	Santa Fe Community College
NM	University of New Mexico
NY	Cold Spring Harbor Laboratory
NY	CUNY Bronx Community College
NY	CUNY Borough of Manhattan Community College
NY	CUNY Kingsborough Community College
NY	CUNY LaGuardia Community College
NY	CUNY Queensborough Community College
NY	Erie Community College
NY	Hofstra University
NY	Monroe Community College
NY	Regents College
NY	Research Foundation of the City University of New York
NY	Rochester Institute of Technology
NY	SUNY College of Technology-Alfred
NY	SUNY Onondaga Community College
NY	Teachers College, Columbia University
OH	Belmont Technical College
OH	Cleveland Advanced Manufacturing Program
OH	Cleveland State University
OH	Columbus State Community College
OH	Miami University-Middletown
OH	Sinclair Community College
OH	University of Cincinnati-University College
OK	Oklahoma State University

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STATE	ATE GRANTEE INSTITUTION
OR	Chemeketa Community College
OR	Hillsboro School District
OR	Lane Community College
OR	Mount Hood Community College
OR	Oregon Coast Community College
OR	Portland Community College
PA	Community College of Philadelphia
PA	Pennsylvania College of Technology
PA	Pennsylvania State University-University Park
PA	Robert Morris College
PR	University of Puerto Rico
SC	Greenville Technical College
SC	Midlands Technical College
SC	South Carolina State Board for Technical and Comprehensive Education
SC	York Technical College
SD	Black Hills State University
SD	Sisseton Wahpeton Community College
TN	American Mathematical Association of Two-Year Colleges
TN	Jackson State Community College
TN	Nashville State Technical Institute
TX	Amarillo College
TX	Austin Community College
TX	College of the Mainland
TX	Collin County Community College
TX	Houston Community College
TX	Lee College
TX	Texas Engineering Experiment Station
TX	University of Texas-Brownsville
UT	Salt Lake Community College
VA	Danville Community College
VA	J. Sargeant Reynolds Community College
VA	Thomas Nelson Community College
VT	Vermont Technical College
WA	Bellevue Community College
WA	Edmonds Community College
WA	Green River Community College
WA	Northwest Indian College
WA	Shoreline Community College
WI	Fox Valley Technical College
WI	Lac Courte Oreilles Ojibwa Community College
WI	Madison Area Technical College
WI	Milwaukee Area Technical College
WI	Waukesha County Technical College
WI	Western Wisconsin Technical College
WV	State College and University Systems of West Virginia

Teacher Preparation CONTINUED FROM PAGE 16

Articulation Partnership for Teachers, Prince George's NSF-ATE project, is organizing faculty meetings, developing professional development workshops, and mentoring colleagues at other community colleges. Because of the new degree, Maryland colleges are adding inquiry methods and making other revisions to many courses including geometry, statistics, chemistry, and physics.

• Phi Theta Kappa, the international honor society of two-year colleges, is coordinating a mentoring project known as Preparing Tomorrow's Science and Math Teachers: The Community College Response. The project pairs instructors at 20 colleges that are revising their math and science courses for teachers with faculty from exemplary teacher preparation programs. ■

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For more information on the ATE program, please see:

National Science Foundation
www.ehr.nsf.gov/EHR/DUE/programs/ate

American Association of Community Colleges
www.aacc.nche.edu/ateprogram

If you have questions or comments, please contact:

Ellen Hause
American Association of Community Colleges
One Dupont Circle, NW, Suite 110
Washington, DC 20036-1176
Phone: (202) 728-0200, ext. 217
Fax: (202) 833-2467
E-mail: ehause@aacc.nche.edu

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The American Association of Community Colleges (AACC) is the primary advocacy organization for the nation's community colleges. The association represents 1,100 two-year, associate degree–granting institutions and some 10 million students. AACC provides leadership and service in five key areas: policy initiatives, advocacy, research, education services, and coordination/ networking.

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American Association of Community Colleges
One Dupont Circle, NW, Suite 110
Washington, DC 20036–1176

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