



POLICY BRIEF:

ADVANCED TECHNOLOGICAL EDUCATION (ATE) PROGRAM

BUILDING A PIPELINE OF SKILLED WORKERS

Introduction

In the Fall of 2008, the American Youth Policy Forum hosted a series of three Capitol Hill forums showcasing the Advanced Technological Education (ATE) program supported by the National Science Foundation (NSF). The goal of these forums was to educate national policymakers about the importance of:

- improving the science and math competencies of our workforce
- developing a workforce that knows how to apply science and math in technical and engineering settings
- raising awareness of the need to prepare skilled technicians for careers in emerging technical industries
- demonstrating effective approaches to providing professional development in science, technology, engineering, and math (STEM) fields for all types of practicing teachers with a focus on applied teaching and learning in technical areas
- showcasing examples of how current ATE programs are addressing these challenges

This report will summarize the major themes and findings of the three events in the series:

- Keeping Up with the Demand for a Technically - Skilled Workforce: The Role of ATE Networks and Community Colleges (September 19, 2008)
- Case Study of Center for Innovation in Technological Education (CITE) and Nashville, TN: Evolution of Case-Based Learning and High School Redesign (November 17, 2008)
- ATE Centers and Community Colleges: Increasing Underrepresented Minorities Participating in STEM Fields (November 21, 2008)

Background

The United States needs a large number of engineers and skilled technicians across various industries to remain competitive in the global economy. A 2005 National Association of Manufacturers survey reported more than 80 percent of U.S. manufacturers indicated that they are experiencing a shortage of qualified workers overall, with 13 percent reporting severe shortages and 68 percent indicating moderate shortages. The survey also revealed that engineers and scientists are in short supply, with 65 percent of manufacturers reporting deficiencies – 18 percent severe and 47 percent moderate.

Ninety percent of respondents indicated a moderate to severe shortage of qualified skilled production employees, including front-line workers such as machinists, operators, craft workers, distributors, and technicians. When asked which types of skills their employees will need more of over the next three years, technical skills, not surprisingly, was the area most commonly selected (53 percent).¹ As recent efforts in education reform have focused on preparing students for the challenges of a global economy, less attention has been focused on the need to develop qualified and highly skilled technicians.

The Advanced Technological Education program was created by the U.S. Congress in 1992 in an effort to boost the nation's supply of highly skilled technicians in math-, science-, and engineering-intensive industries. Funded and overseen by the National Science Foundation, ATE's 36 centers — located in every part of the country — coordinate efforts among high school and community college educators, business leaders, and government officials to recruit and train workers for rewarding careers in growing sectors of the economy such as biotechnology, chemical technology, nanotechnology, photonics, and information and security technologies. The goal of the ATE program is to strengthen the skills of technicians whose work is vitally important to the nation's prosperity and security.

Two-year community colleges have a leadership role at ATE centers and projects, working in partnership with universities, secondary schools, business and industry, government, and non-profit agencies to design and carry out model workforce development initiatives. As the main providers of technical education in the United States, community colleges are uniquely poised to develop the necessary tools and resources to increase the supply of skilled workers by focusing on developing a comprehensive K-20 pipeline that provides entry and exit points for students to move between formal education and training and work opportunities.

During the 2008 fiscal year, the 36 ATE Centers and numerous related projects shared \$51.32 million. From its inception, the ATE program has dedicated funding to innovation; sites have had the flexibility to spend their funds on a range of activities from program and material development to evaluation and advisory committees. As programs have developed and evolved over time, they have been able to effectively leverage federal, state, and local funding streams to provide high quality educational opportunities for students and educators.

Best Practices from the Advanced Technological Education Program

Throughout the forum series, it was evident that ATE centers and projects were addressing critical areas in technical training and developing effective pipelines of trained workers for their targeted industries. Each of the programs included in the AYPF forums had a unique strategy for achieving this goal, but the ATE Centers shared a number of effective practices, including: the ability to leverage resources, responsiveness to industry needs, focus on innovative professional development, and commitment to reaching out to underserved populations. Each of these practices is described more fully in the following sections.

¹The Manufacturing Institute, National Association of Manufacturers, Deloitte Consulting LLP. 2005. *Skills gap report – A survey of the American manufacturing workforce*. Washington, DC: National Association of Manufacturers.

Ability to Leverage Resources

While the NSF funding provided ATE programs the seed money necessary to start their projects, the centers and programs have successfully leveraged a variety of other resources to sustain the work and support their growth. Throughout the forum series, presenters described how partnerships across education and industry were critical to their success.

The ICT Center (National Center for Information and Communications Technologies) at Springfield Technical Community College in Massachusetts has been a critical partner in the growth of the Regional Technology Corporation (RTC), an organization created expressly to increase the number of technology-based businesses in the “Knowledge Corridor” extending through western Massachusetts into New York State and Connecticut. Together, the ICT Center and RTC run a number of training programs through the community college to attract and retrain information technology (IT) workers as well as to support mid-career professionals. Through the partnership, regional employers have begun to appreciate Springfield Technical Community College as necessary to both building and sustaining the pipeline of skilled workers for the IT fields.

The Center for Innovation in Technological Education (CITE), through its partnership with Alignment Nashville (Tennessee) — an organization founded by the business community dedicated to aligning the work of non-profits and community-based organizations on public education in the city — has been able to support the high school redesign efforts in Metro Nashville schools. By utilizing both the problem-based, case-based methodology and professional development developed through its work at the community college, as well as its expertise in building business partnerships to support education, CITE supported efforts to develop an IT academy at a low-performing high school. Working through Alignment Nashville, CITE provided professional development workshops to help teachers integrate problem-based learning into the classroom (discussions and projects related to how one would respond to problems drawn from real-world situations). Additionally, working collaboratively, CITE and Alignment Nashville leveraged relationships within the business community to create opportunities for both teachers and students to intern at local IT companies. With support from all these partners, the IT Academy flourished and became an excellent source of new IT talent for the city. The success of this effort led Metro Nashville to win a five-year, \$6.6 million Small Learning Community grant from the U.S. Department of Education to create wall-to-wall academies in all the district’s high schools.

Responsiveness to Industry Needs

The ATE’s Centers and projects have strong partnerships with employers, and they are well poised to utilize these relationships to stay current on the needs of industry. The programs showcased throughout our forum series described how their programs and initiatives continually evolve based upon input and feedback from business partners and graduates.

The Center for the Advancement of Process Technology (CAPT) was created through a partnership between the College of the Mainland in Texas City, Texas, and an alliance of regional petrochemical companies in dire need of skilled employees in the region. Relying initially on funding from the Carl D. Perkins Act and Texas Workforce Commission, the Gulf Coast Process Technology Alliance developed a standardized two-year Associate of Applied Science degree in process technology. Recognizing that both the curriculum and its development process would be useful to community colleges across the county that are training process technicians, CAPT was created with funding from the ATE program. Currently, CAPT is working with 50 community colleges to create two-year degree programs for careers at refineries and related industries as well as leveraging business partnerships to provide scholarships, internships, and recruitment networks so students graduate

both debt-free and linked to available jobs. Lee Rector, Deputy Director, Texas Workforce Investment Council, articulated CAPT's approach to degree development by saying, "for the most part, employers – not educators – have been in the driver's seat and have remained the protectors of quality and relevance of the programs offered."

At DC BioTech, a two-year old career academy at McKinley Technical High School in Washington, DC, supported by the ATE Program, coursework dually focuses on critical academic/technical skills as well as professional behaviors within the field. To that end, teachers utilize professional manuals and projects in the lab/classroom and expect students to behave as they would in a workplace. This classroom preparation is critical as students are eligible to participate in summer internships with local biotech companies. By understanding the professional expectations and behaviors prior to their internship, students are able to fully participate in the work within the laboratories, gain real world experience, and contribute to the businesses.

Focus on Innovative Professional Development

A cornerstone of the ATE programs is its commitment to professional development for educators and industry professionals. The Centers and projects highlighted in our forum series provided professional development to both educators and professionals within their industries through exciting new methods and modes of delivery.

The ICT Center provides support and training to 14 academic institutions in ten states through formal partnerships, but reaches a wider community of educators and industry professionals through use of a variety of cutting-edge, Internet-based resources including blogs, podcasts, videoconferences, and a YouTube channel. This method of dissemination ensures the ICT Center keeps current with the latest industry technology, ensuring that their curriculum is also up to date. Additionally because many of the modes are interactive, the ICT Center can receive immediate feedback on industry needs and edit their information in near real-time.

The emphasis of problem-based, case-based projects has catapulted CITE to the forefront of providers of professional development in technological education. Problem-based, case-based learning asks educators to conduct their classroom as an innovation laboratory for business and guides students to creating their own solutions, rather than simply lecturing or instructing. Developed by CITE and piloted at Nashville State Community College, Corporate Scholar Solutions (CSS) introduces real-world, real-time business problems into technology classrooms to seek solutions through actual partnership with the business community. The CSS program is providing a robust and interactive opportunity for faculty, students, and industry to engage in mutually-beneficial experiences that identify and align workforce skill sets with current industry needs. At the same time, the Case Files project has further refined the use of second generation problem-based, case-based learning experiences, thereby providing a necessary complement for the CSS program. In addition to providing content, CITE provides training to classroom instructors on how to manage CSS and utilize the Case Files project. CITE has made these training programs available to other ATE Centers and community colleges across the country through the ATE program network.

Commitment to Reaching Out to Underserved Populations

Digital Bridge Academy (DBA) at Cabrillo College, Aptos, California, is one of many ATE projects focused on serving student populations both underrepresented in postsecondary education as well as across the technological fields. This innovative program is unlike any other of its kind; it takes a totally different approach to supporting at-risk students by sparking their desire to learn about technology. DBA empowers students to

learn how to channel this motivation within academic and work environments. The site at Cabrillo College is more than 90% Latino and focuses on preparing students to be successful in math and science coursework through project-based learning. A comparative evaluation of students in the DBA to traditional community college students revealed that 75% of DBA students completed two years of college coursework compared to 32% of the comparison population. The model is adaptable to any college preparing students for knowledge-based careers in any local economy.

Recommendations

The ATE program has supported a wide range of Centers and projects that have become critical to developing a pipeline of skilled technicians in our country. Individually, their achievements are impressive, but as a network they have created a learning community committed to continuous improvement of their respective fields.

Throughout the forum series, presenters made recommendations for federal policy that both affect the ATE program and their primary host institutions, community colleges. These recommendations can be summarized in the following two areas: incentivizing innovation through continued support of the ATE programs and recognizing the role of technical training in bolstering science, technology, engineering, and math education.

Through their strong partnerships with educational institutions and business partners, ATE Centers and projects are able to serve as innovation labs for emerging ideas in professional development/training, curriculum, and delivery of technical content. Their benefits extend beyond improving educational outcomes, by also serving as an important economic development tool for communities across the country. By operating at the intersection of education and business, ATE Centers and projects have the ability to remain nimble to respond to industry needs through their impact on training and curriculum. Their unique role is critical to ensuring the United States remains a leader technologically as well as educationally. The funding from the National Science Foundation provides flexibility for ATE Centers and projects to innovate, invent, and reinvent.

The national emphasis on improving STEM education often overlooks many of the resources that currently exist, particularly the ATE program. While the initial focus of ATE Centers and projects was at the community college level, it is evident that their work is transferable across the P-20 spectrum of education. Additionally, the expertise at integrating education and business partners to provide real-world training and skills can be informative to states and localities looking to improve both education and workforce outcomes. By grounding the technical material in real-world applications, ATE Centers and projects have effectively integrated STEM education with technical training for both students and educators alike. Their success across the broad spectrum is unparalleled and unfortunately overlooked. The extensive network crisscrosses the country and should be better utilized, particularly in helping high schools provide high quality STEM instruction and in reaching out to traditionally underrepresented populations in STEM careers

Resources

To learn more about the ATE Program, please visit:

- <http://www.atecenters.org/>
- <http://www.aacc.nche.edu/Resources/aaccprograms/ate/Pages/default.aspx>

To read a summary of the AYPF's events, please visit:

- Keeping Up with the *Demand* for a Technically - Skilled Workforce: The Role of ATE Networks and Community Colleges: <http://www.aypf.org/forumbriefs/2008/fb091908.htm>
- Case Study of Center for Innovation in Technological Education (CITE) and Nashville, TN: Evolution of Case-Based Learning and High School Redesign: <http://www.aypf.org/forumbriefs/2008/fb111708.htm>
- ATE Centers and Community Colleges: Increasing Underrepresented Minorities Participating in STEM Fields: <http://www.aypf.org/forumbriefs/2008/fb112108.htm>

About the American Youth Policy Forum

The American Youth Policy Forum (AYPF), a nonprofit, nonpartisan professional development organization based in Washington, DC, provides learning opportunities for policymakers, practitioners, and researchers working on youth and education issues at the national, state, and local levels. AYPF's goal is to enable participants to become more effective in the development, enactment, and implementation of sound policies affecting the nation's young people by providing information, insights, and networks to better understand the development of healthy and successful young people, productive workers, and participating citizens in a democratic society. AYPF does not lobby or advocate for positions on pending legislation. Rather, we believe that greater intellectual and experiential knowledge of youth issues will lead to sounder, more informed policymaking. We strive to generate a climate of constructive action by enhancing communication, understanding, and trust among youth policy professionals. AYPF publishes a variety of nationally disseminated youth policy reports and materials, many of which may be viewed at www.aypf.org.

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