

**U.S. House of Representatives Committee on Science and Technology  
Subcommittee on Research and Science Education**

June 19, 2007 hearing on:

*The Role of Community Colleges and Industry in Meeting the Demand for Skilled  
Production Workers and Technicians in the 21<sup>st</sup> Century Economy*

**Questions for the Record to Dr. Stephen Fonash**

Director

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**Questions submitted by Chairman Brian Baird**

1. In your testimony you note that community colleges are often not well equipped to aggressively market their program to potential students. Have you seen industry take an active role in marketing their technician and skilled production jobs to potential employees? Could the private sector companies you work with be doing more to attract students to vital training programs?

In general, community colleges do not effectively package or market their technical programs. Those that have the ability to offer cutting edge technology taught by knowledgeable faculty with state-of-the-art facilities, and that have pathways in place to four-year degrees, offer potential students outstanding value and opportunity. Such two year programs offer much more hands-on access to “real” equipment than four-year engineering and science degrees thereby giving students a meaningful taste of what it is like to work in a technology field and meaningful skills to do so after just two years of training. This immediate immersion and the chance for technical jobs after two years is very helpful to students who are not sure if they want a career in science and technology and are “trying to find themselves”. They can immediately get a “feel” for what these careers are like and can make more informed decisions. The programs that have pathways in place to four-year degrees also offer potential students the opportunity, if they so choose, of a lifetime of learning possibilities. These advantages, opportunities, and possibilities could and should be packaged and marketed by community colleges as a “two-year degrees—doors to a lifetime of opportunities” package. To make it all even better, this whole package of opportunities comes with a tuition price tag that is generally much less than the tuition costs of the four-year institutions.

While community colleges do not market these opportunities well, industry cannot be expected to greatly help in two-year degree marketing—either by assisting the colleges or through direct industry efforts. There are some exceptions. For example, industry associations such as the Semiconductor Industry Association (SIA) and the National Association of Manufactures (NAM) do conduct marketing efforts. However, individual companies face enormous competitive pressures, cannot afford to aid in marketing two-year degree programs, and must focus on their immediate

needs in order to stay in business. Industry understandably wants students with the skills required to meet today`s immediate challenges, which means that they want students to learn today`s job skills. Unfortunately, these jobs—and their requisite skills—may migrate out of the country by tomorrow. Educators need to compensate for this by making sure students are taught career skills and develop a realization for the need for a lifetime of learning. Students have to develop a broad knowledge base for their “economic survival” over the course of their careers and they must learn to be intellectually “fast on their feet” so they can evolve as technology evolves.

Although industries are focused on surviving in today`s international markets, they can be a very vital partner in the “education for a career approach”. They have a strong sense of what tomorrow will bring. Consequently, their help is needed by educators in making sure curricula for the “two-year degrees—doors to a lifetime of opportunities” package continuously develop and improve. Since the economic forces industry faces will not allow individual companies to play major roles in developing and promoting educational opportunities, that burden must fall to industry associations, state and federal government. Among these, only government can provide the stability, perspective, and resources needed to plan and educate beyond this quarter`s needs.

2. In your testimony you state the benefits that accompany a tech-training program paired with a research university. For community colleges without access to a university, or for programs outside areas of interest to universities, can ATEs serve a similar role as research universities?

The National Science Foundation`s ATE program strives to make sure that there are diminishing numbers of community colleges without access to a research university. One of the key ways that the ATE program is doing this is by serving as a catalyst to bring together community colleges and research institutions to (1) share research university resources and expertise, (2) enable community college faculty enrichment, and (3) develop new two-year to four-year degree programs and pathways. It is very important to point out that, for this type of leveraging to work, not every community college needs to be directly linked to a research university in its locale. New and effective educational programming developed by an ATE center or project is quickly disseminated across the country through the ATE network. As an illustration, the concepts developed at ATE Center for Nanofabrication Manufacturing Education at Penn State are being leveraged by community colleges in more than 20 states. In addition, the approaches of this PA ATE center are being extended beyond nanotechnology to include programs areas such as biotechnology, information science and technology, engineering technology, and others.

We would not suggest that ATE Centers can or should even try to provide community colleges with the kinds of resources that research universities can. However, ATE centers and projects around the country are playing a crucial role in promoting innovative approaches to technical education, including linkages between research

universities and community colleges. We are also observing a growing interest among research universities in participating in these kinds of partnerships. Research intensive Land Grant universities are particularly engaged because these arrangements help them fulfill their three-part mission of education, research, and service. Research universities also recognize that by strengthening community college technical programs and creating student pathways from associate to baccalaureate degrees, the universities are helping to develop a pool of qualified future upper division undergraduate and graduate students for their own programs, including students from underrepresented groups which community colleges often tend to disproportionately serve. This is a win-win-win arrangement for community colleges, research universities, and, most importantly, students—an arrangement that the ATE program is helping to seed and promote through its centers and projects.

3. Can you please describe in more detail the career pathway programs you mentioned in your testimony? How many high school students have participated in these programs for advanced manufacturing through the Center for Nanotechnology Education and Utilization affiliated community colleges and have you been able to track these students: What factors attract high school students to a two-plus-two program?

The PA Nanofabrication Manufacturing Technology Partnership has had 423 students who have completed the capstone semester total immersion in nanotechnology fabrication, synthesis, and characterization. Those students in this group that passed through since the establishing of our ATE center have been able to utilize two types of education pathways: the two-year degree to four-year degree (2+2) pathway and the high school/votech school to the two-year degree to four year degree (2+2+2) pathway. Before the efforts of our ATE center, there were, in most cases, no clear 2+2 pathways from two-year to four-year degree granting schools in PA. Today, using nanotechnology as a coalescing theme, there are 2+2 pathways that lead from all 22 nanotechnology two-year degrees available in PA to four-year degrees. These available four-year degrees are in engineering management, various areas of engineering technology, biology with a nanotechnology concentration, chemistry with a nanotechnology concentration, and physics with a nanotechnology concentration. One can go to our web site at [www.cneu.psu.edu](http://www.cneu.psu.edu), click on a specific two-year degree site on the map provided, and immediately be given the available four-year degrees set up for that specific two-year degree site.

The high school/votech school 2+2+2 nanotechnology-based pathways in PA that have resulted from the efforts of our ATE center currently number thirty-one. The factors that we find attract high school students to 2+2+2 nanotechnology-based pathways include: (1) the opportunity to take courses at a community college campus, (2) access to community college facilities (e.g., computers, sports facilities), (3) the ability to get community college credit for high school courses in cases where high school teachers are certified by the colleges, and (4) the ability to lighten their college credit load.

The 2+2 and 2+2+2 pathways have been set up recently as part of our ATE activities; consequently our tracking data are limited. In a first survey taken in 2005, we found that 36% of the students were continuing their degrees past the two-year level. However, this cohort is not entirely made up of students pursuing 2+2 programs since some were students who came from four-year degree programs. A survey aimed at more precise 2+2 data is currently underway.