



## **nanotecKnowledge Program Background**

From its inception, **nanotecKnowledge** has aimed at developing a sustainable, regionally-resident, nano-biotechnology technical education track. Our goal was to be *ahead of the nanotechnology workforce curve*. Initially, we targeted regional Community Colleges and developed five courses and curriculum content suitable for an Associate's Degree or as an adjunct to traditional biology, chemistry, and physics courses as well as an Introduction to Nanotechnology course, together with the necessary infrastructure.

This addresses the need identified by our industry partners for indigenous workers at this education level for technicians, quality assurance/quality control positions, and as advanced-technology production workers. The core content within the two-year education curriculum is also ideally suited for a certificate program for continuing professional education and for a 2+2 program. We also developed a better understanding of how to effectively reach HS students to promote a sustainable regional pipeline of immediate post-high-school students into technical education. We have used technology and new educational structures to lower the barriers to reaching the goal of a broad, technically-skilled workforce.

In order to expand instructional capacity for teachers, seven regional Community College faculty representing PA, NJ, and DE completed a nanotechnology short course in August 2005. The high-school level short course was approved for Act 48 continuing education credit by the PA Department of Education and Immaculata University approved it for graduate credit for teachers pursuing advanced degrees. Teacher incentives are PA Act 48 continuing education credit as well as analogous credit in NJ and DE.

We quickly learned, though, that for Community Colleges to offer new degree programs, they require a pipeline of students from secondary schools. Accordingly, we expanded our program to high schools. Advised by high school teachers, we learned that to make the most substantial impact, we should begin even earlier, at the Middle School (MS) level. Middle Schools pose a particular challenge, both because of the students' age and the modest scientific training of many faculty. It is in the middle schools that national studies have found the most rapid decrease in students' interest in science and technology. Students are lost to science and technology, which exacerbates the national crisis in S&T education.

Working with an advisory committee comprising teachers, principals, and administrators from community colleges, secondary and middle schools, as well as with technology companies, we explored the constraints inherent in the educational system. As a result, our programs are sensitive to the difficulty of introducing new curricula, meeting state-mandated academic standards and assessments, pressures on teachers created by "No

Child Left Behind,” “The Classroom of the Future” (in PA), as well as the reality that teachers have extraordinary demands on their time. *Our program’s driving principle has been to reduce barriers to participation.*

We have offered numerous workshops, both face-to face and through videoconference to middle and high school teachers, traditional graduate-level courses to high school teachers and community college faculty, and an on-line course to high school teachers with an experiential component, two days of laboratory activity. To date we have touched more than 500 teachers and 1500 students.