

An Overview of US Approaches to Nanotechnology Education and Workforce Development

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ABSTRACT

US nanotechnology education and workforce development efforts focus on public/informal education, on nurturing a K-12 pipeline, and on creating effective post-secondary nanoscience and engineering (NSE) education. Efforts also include insuring efficient and effective pathways within post-secondary education enabling transitions from two-year degree programs to four year degree programs and beyond. This latter activity is an important one since it is estimated that 40% of US undergraduates begin their education at community colleges.

The public /informal nanoscience and engineering (NSE) education activities are principally led in the US by the Nanoscale Informal Science and Engineering Network (NISE Net). The K-12 NSE activities involve a spectrum of participants from companies (e.g., SRI, Int which is developing a complete curriculum in nanotechnology) to National Science Foundation (NSF) centers such as the National Center for Learning Technology (NCLT) and NanoHUB. The K-12 activities also include the NSF Research Experience for Teachers (RET) program which gives teachers the opportunity to participate in nanotechnology research and NSF programs designed to have graduate students bring NSE concepts to the secondary school classroom. In addition, the Department of Energy and a number of other agencies also have programs which are charged with assisting in transferring NSE concepts into the K-12 classrooms. Since the US has over 3000 post-secondary institutions, a key goal is to bring nanoscience and engineering education opportunities to students at all these various schools which include 2-year degree community and technical colleges, 4-year degree colleges, small universities, and the research universities. An effective approach to insuring nanotechnology resources are available at all these different types of institutions is the concept of resource sharing. This has led to the NNIN user facility network for research support and to education networking approaches such as the NACK teaching resources web site (www.nan4me.org) for post-secondary educational materials support. This latter sharing of resources includes research university-developed power point lectures for 6 undergraduate courses in NSE as well as videos of each of the lectures of these 6 courses. These are all downloadable and, since they are targeted for the sophomore level, all usable by 2-year degree community and technical colleges as well as by 4-year degree institutions. Other US post-secondary NSE activities include the NSF Research Experience for Undergraduates (REU) program which gives undergraduates in all these various institutions the potential opportunity to engage in NSE research. In addition, individual colleges and universities have also developed their own NSE programs. These range from baccalaureate degrees in NSE to minors, specializations within conventional science or engineering degrees, in nanotechnology.