Nanoscience Education in NSF/EHR

From an educational point of view, nanoscience and technology are attractive because they integrate all the scientific disciplines and have applications that can motivate middle and high school students to learn scientific and technological concepts. The question is what concepts are developmentally appropriate for students to learn and how to prepare students and teachers to learn them. An EHR-funded workshop held by the Nanoscience Center for Learning and Teaching (NCLT) developed the "Big Ideas" in science needed to understand nanoscience. The ideas include size and scale, properties of matter, dominant forces, tools, technology and society, and self-assembly. NCLT research is also clarifying the significant and developmentally appropriate learning goals in nanoscience for grade 7–16 learners and helping guide instructional materials development, professional development, and assessment. Their report has been vetted by scientists, science educators, and teachers and is to be published by the National Science Teachers Association this spring.

At the same time, separate projects develop instructional materials and test them with high school students and teachers to determine whether indeed the materials motivate students to learn the concepts. Preliminary data with dozens of classrooms and hundred of students indicate that nanoscience and technology do interest students, but some concepts remain difficult. The materials are being refined and subjected to further tests, and a model for professional development of teachers is being carried out.

The NNIN site at Pennsylvania State University, with funding from NSF's Directorate for Education & Human Resources (EHR) Advanced Technological Education Program, is a center for technician education in nanotechnology. The Center works with the two-year colleges in Pennsylvania to develop courses in nanotechnology. A capstone semester at Penn State provides six hands-on courses using their facilities. This model has spread to Dakota Community College in Minnesota working with the University of Minnesota and, in microsystem education, to the University of New Mexico.

Patents or other steps toward commercialization:

Contributing Agency: NSF