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Directorate of Education and Human Resources Preparing the Scientists and Engineers of the Future

"First, we must have plenty of men and women trained in science, for upon them depends both the creation of new knowledge and its application to practical purposes." -

Vannevar Bush, Science. The Endless Frontier

EHR programs work in consort with each other and other NSF programs to ensure that advances in knowledge are rapidly incorporated in best-practice models of education and that an adequate flow of able students are engaged in learning S&E and graduating in S&E fields. EHR is responsible for a major part of NSF's financial investment toward achieving its *People* goal. EHR also contributes in a unique way to the NSF *Ideas* goal through its investment in S&E education research and evaluation.

In order to maximize the impact of the EHR investment, EHR collaborates with the other NSF directorates in meeting the NSF *People* goal. This collaboration often involves joint management, development, and funding of NSF programs, as well as joint funding of individual projects. Partnerships between EHR and the other NSF directorates ensures synergy between the research focus of the directorates and those who will conduct that research in the future, between research needs and a responsive curriculum, and between workplace needs and teaching and learning modes.

EHR Mission

Our prime mission is to lead the nation's efforts in developing the next generation of S&E professionals.

Objectives

Investments toward accomplishing this mission are made at all education levels (graduate, undergraduate, K-12 and informal education) within three objectives:

1. Develop advances in S&E education that provide the knowledge base and skills needed for a robust and innovative S&E enterprise
2. Attract more U.S. students to S&E and retain them in the enterprise
3. Broaden participation in S&E fields
4. Provide the research base needed to efficiently and effectively accomplish the above.

Many different strategies supporting each objective have been identified and implemented in order to accomplish the EHR mission. These strategies and some examples of the impact of the EHR investment are described below.

A review of these strategies reveals that there are approaches that are common to each of the objectives:

1. Development of new materials and instructional approaches

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2. Support of discovery research and research on practice to develop the knowledge that often guides development of new materials and instructional approaches
3. Use of objective third party evaluation to document the outcomes of projects and programs.
4. Support of informal science education activities to leverage interest in S&E and S&E careers
5. Professional development activities to help the S&E workforce remain up to date
6. Support of partnerships across disciplines, infrastructures within institutions and across highly varied institutions

1. Develop Advances in S&E Education

In order to create new knowledge and the next innovations, the scientists and engineers of the future will be required to be interdisciplinary in their approach, comfortable in functioning in a global society, and able to lead in their fields. EHR supports the development of leading-edge education that provides scientists and engineers with the skills and knowledge base needed in this new environment. This involves investing in research on learning. It also involves investments in programs that explore new modes, methods and approaches in K-12, undergraduate, graduate and informal education that: improve student learning, offer new avenues to becoming science and engineering professionals, and result in scientists and engineers with the skill sets required in the 21st century. EHR monitors its program effectiveness through a rigorous evaluation process involving internal and external review. Many of the investments in improving quality also contribute to increasing the quantity and diversity of scientists and engineers in the nation. Because of its structure and staffing EHR is uniquely suited to address the core educational issues that cut across disciplinary considerations.

Strategies

1. Develop innovative and timely instructional materials and methodologies for S&E education at all levels. Methods and materials that reflect current knowledge and technology and are informed by educational research.
2. Support research on learning and teaching that informs the development of high quality scientists and engineers.
3. Monitor and evaluate projects and programs to determine improvements achieved
4. Use informal science education venues to reach a wide range of the population.
5. Keep prospective and practicing teachers current in S&E and effective teaching practices as appropriate to their discipline and grade level.
6. Promote interdisciplinary approaches to teaching and learning.
7. Encourage partnerships among academic institutions, industry, business and government.
8. Develop collaborations across different tiers of educational institutions: K-12, two-year colleges, four-year colleges and universities, and informal education organizations.
9. Effect synergy and leveraging of resources across divisions within institutions
10. Integrate assessment practices and instruments with teaching and learning as a means of increasing their usefulness and accuracy.