People

People are NSF's most important product. At NSF, placing research and learning hand in hand is our highest priority, and the people involved in our projects represent both the focus of our investments and the most important products of them. Across the Foundation's programs, NSF provides support for almost 200,000 people, including teachers, students, researchers, post-doctorates, and trainees. Support for programs specifically addressing NSF's Strategic Goal of "People — A diverse, internationally competitive and globally-engaged workforce of scientists, engineers and well-prepared citizens" totals about $888 million in FY 2001, an increase 10.8 percent over FY 2000 (H-1B Nonimmigrant Petitioner Fees will increase total support to over $917 million).

Support by Level of Education

(Millions of Dollars)

	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate
PreK-12	281	283	276
Undergraduate	193	189	237
Graduate & Professional	255	258	301
Other Support[1]	71	71	73
Total, People[2]	$800	$801	$888

[1] Excludes $31.5 million in FY 2000, and $29.5 million in FY 2001 from H-1B Nonimmigrant Petitioner Fees

[2] Totals may not add due to rounding.

NSF's investments in ideas and tools also create investments in people. Education is an integral component of all research projects in that the skills and training needed for the next generation of scientists, engineers, and technologists are provided within the context of the research experience. Almost 40 percent of the funding for research grants — an amount approaching $1 billion in FY 2001 — provides support for

researchers and students, including more than 61,000 post-doctorates, trainees, and graduate and undergraduate students. The Foundation places a high priority on formal and informal science, mathematics, engineering, and technology (SMET) education at all levels — preK-12, undergraduate and graduate, professional, and public science literacy that engages people of all ages in life-long learning. NSF activities are also aimed at enhancing the diversity of the science and engineering workforce and increasing participation and achievement of underrepresented groups, with particular attention to the development of those who are beginning careers in science and engineering. NSF programs are increasing the opportunities for all students to learn mathematics and science, prepare for and complete higher education, join the workforce as competent and contributing members, and become well-informed, science-literate citizens of the United States.

Each of the four interdependent initiative areas makes a major investment in people. For example, approximately $19 million will be used in FY 2001 to strengthen information technology education and workforce development. A critical national need is educating our citizens to fill the estimated one million vacant positions in the information technology industry. Addressing the shortage of IT workers will require development of innovative educational technologies, such as highly interactive computer science courseware that is multilingual, multicultural and multimedia, with the capability to operate over distributed environments such as the Internet. Eliminating the digital divide will require research in the social, economic and cultural factors that inhibit minority participation in the IT.

Many of the following activities are also part of the 21st Century Workforce initiative. Research on the science of learning, development of the instructional workforce, and diversifying the workforce are the three focus areas of this initiative.

PreK-12 Education

The FY 2001 Request for PreK-12 programs is $276 million, a decrease of $7 million from FY 2000. NSF will initiate a new program for Centers for Learning and Teaching (CLT) at a funding level of $20 million, an increase of $14 million over the FY 2000 pilot program. CLTs address two components of quality SMET education: strengthening teacher content knowledge and developing the next generation of experts to guide the development of instructional materials, classroom and large-scale assessments, education research and evaluation, and informal education. This increase will be offset by reductions in ongoing programs such as systemic reform, instructional materials development, teacher enhancement and teacher preparation activities.

Undergraduate Education

The FY 2001 Request for programs to improve undergraduate education is $237 million, an increase of $48 million over FY 2000.

- Funding for the Advanced Technological Education program will total $39 million, an increase of $10 million over FY 2000, to strengthen the science and mathematics preparation of technicians for the high-performance workplace.

- A new effort for improving education at Tribal Colleges will be funded at $10 million. This program will encourage Native Americans to pursue information technology and other science and technology fields of study, as well as increase the capacity of tribal colleges to offer relevant science and technology courses and enhance K-12 education in feeder school systems.

- The Request also includes $11.2 million for a new Scholarships for Service program to recruit and educate the next generation of federal information technology managers by awarding scholarships for the study of information security.

- NSF will provide $1.8 million to initiate a new program for Distinguished Teaching Scholars to recognize undergraduate faculty whose integration of research and education enhances the quality of the future workforce and the general public.

- The Undergraduate Mentorships in Environmental Biology (UMEB) will be expanded by $800,000, to total $2 million in FY 2001; this program seeks to address concerns about participation rates of underrepresented groups in environmental biology.

- The Network for Diversity and Education in the Geosciences is initiated at $3 million and aims to make high-quality geoscience education widely available.

- Other efforts for undergraduate activities include the Louis Stokes Alliances for Minority Participation, the Historically Black Colleges and Universities – Undergraduate Program, and the Model Institutions of Excellence program. In addition, Course, Curriculum, and Laboratory Improvement will have a new emphasis on undergraduate assessment.

Graduate & Professional Education

The FY 2001 Request for graduate and professional programs totals $301 million, an increase of approximately $44 million over FY 2000.

- Funding for the Graduate Teaching Fellows in K-12 Education (GK-12) program, which supports graduate and advanced undergraduate SMET students as content resources for K-12 teachers in the classroom, will increase by $16 million to a total of nearly $28 million.

- Support for the Integrative Graduate Education and Research Training (IGERT) program will increase by nearly $3 million to total over $31 million. IGERT is distinguished from other training programs in that it has a strong emphasis on interdisciplinary training, innovation in graduate education, and broadening participation through the involvement of underrepresented groups. In its first two years of operation, the program attracted a large number of proposals representing the full range of NSF science and engineering disciplines.

- Support for the Faculty Early Career Development (CAREER) program will total nearly $114 million, an increase of $12.3 million.

- Funding for ADVANCE, to increase the participation and advancement of women in all fields of science and engineering, will total $20.2 million, an increase of nearly $8 million over FY 2000.

Other Support

The FY 2001 Budget Request for these activities is $73 million. Included in this total is support for such activities as informal science education, evaluation efforts, and programs for gender equity and for persons with disabilities. An additional $29.5 million from H-1B nonimmigrant petitioner fees will be made available to NSF for computer science, engineering, and mathematics scholarships; grants for mathematics, engineering, and science enrichment courses; and systemic reform activities.

NSF also supports international research and training experiences for U.S. researchers in both developed and developing nations. The rapid globalization of science and technology challenges traditional assumptions about how we prepare our scientists, engineers, and educators to succeed. Training must include an understanding of the global environment – the technologically advanced countries of Europe and Japan, as well as others. A unique opportunity exists in the dynamic newer economies of East Asia, which invest heavily in scientific and engineering research and are rapidly developing knowledge-intensive economies.

FY 2001 Performance Goal for People

The following table summarizes NSF's FY 2001 Performance Goal for People. For additional information, see the FY 2001 Performance Plan.

Outcome Goal	FY 2001-2005 GPRA Strategic Plan	FY 2001 Areas of Emphasis
	NSF is successful when results reported in the period demonstrate sufficient progress in achieving:	
People -- A diverse, internationally-competitive and globally-engaged workforce of scientists, engineers, and well-prepared citizens.	❖ Improved mathematics and science achievement for U.S. students at the K-12 level leading to levels of skill and understanding for all citizens that make them competitive in a technological ❖ A science and technology workforce that draws on the strengths of America's diversity and has global career perspectives and opportunities. ❖ Globally engaged science and engineering professionals who are among the best in the world. ❖ A public that understands the processes of and benefits that accrue from science and engineering.	K-12 systemic activities Investments in 21st Century Workforce: ◗ Enhancing instructional workforce - Centers for Learning and Teaching - Graduate Teaching Fellows in K-12 Education ◗ Broadening participation. ◗ Addressing near-term workforce needs.

Highlights

Examples of accomplishments resulting from support for People are discussed below.

Informal Science Education (ISE) provides rich and stimulating opportunities outside formal classroom settings. Exhibits at museums, aquaria, zoos, IMAX films, television, and community programs increase appreciation, interest, and understanding of science for individuals of all ages, interests, and backgrounds. Most ISE projects are designed to reach large audiences and have the potential for significant regional or national impact. Annually, these projects reach over 150 million individuals. For example, an estimated 50 million people visit ISE-supported exhibits and projects at science and technology centers and museums, and television, radio, and film projects reach over 100 million people. *A Science Odyssey*, sponsored by ISE, is a ten-hour PBS television serial that allows viewers to survey 100 years of scientific pursuits, recast their perceptions of science and scientists, and be inspired by a view of science as a never-ending and deeply human quest for answers and solutions.

The **Integrative Graduate Education and Research Training (IGERT)** program fosters a multidisciplinary framework in which faculty and students may work together across traditional boundaries, sharing knowledge, instrumentation, and a willingness to build new and unique intellectual capital. One IGERT project at Cornell University is bringing together scientists from many disciplines to investigate the nonlinear mathematical behavior of various systems including applications in physics, mechanical engineering, medicine, and finance. Until now, a mathematics student studying dynamical systems was unlikely to cross paths with an immunologist studying AIDS or an electrical engineer studying blackouts in the power grid, yet they are all investigating nonlinear phenomena. The Cornell project enables such interaction, and students and faculty at this IGERT site have had the opportunity to work with mathematicians and scientists who discovered that nonlinear dosages of drugs are especially effective in the treatment of AIDS.

Systemic Education Reform. In FY1999, 48 of the 68 active systemic initiatives under the **Urban Systemic Program** (USP), **Statewide Systemic Initiatives** (SSI), and **Rural Systemic Initiatives** (RSI) have implemented standards-based mathematics and science curricula in over 81% of the participating schools. The initiatives have provided high-quality professional development for over 150,000 teachers, more than 1/3 of the science and math teachers in participating school systems during FY 1999. All participating educational systems in systemic reform programs demonstrated some level of improvement in student achievement in mathematics and science on a battery of system-selected instruments. For example, in Detroit, a urban systemic initiative city, students showed significant gains in academic achievement in science and mathematics on the *Michigan Educational Assessment Program* between 1994 and 1998: in grade 5 science, an increase from 18% to 33%; in grade 7 mathematics, an increase from 16% to 33%; and in grade 4 mathematics, an increase from 33% to 68%.

Outreach to Teachers. During the past five summers, hundreds of Houston area educators have attended the annual **GirlTECH** computational science training program at Rice University's Center for Research on Parallel Computation (CRPC) which is supported by NSF. Participating teachers receive intensive technology training and explore innovative teaching strategies that impact gender equity in the classroom. GirlTECH's web site features research on girls and technology and makes available a large and diverse collection of online lesson plans generated by participants over several years. Lesson and project plans suitable for early elementary through high school levels can be found that span the physical, mathematical, biological and natural sciences, often emphasizing scientific observation and computer/Internet usage. In the first year of the program, GirlTECH documented approximately 1,000 teachers indirectly trained by the program though knowledge transfer by GirlTECH participants. The current total is estimated to be about 10,000.

Chickscope is an interdisciplinary program that puts magnetic resonance imaging (MRI) technology into K-12 classrooms via the Web. Teachers and students can access and operate a MRI system to peer inside a chick embryo and observe its development over the 21 days it takes the egg to mature. The National Computational Science Alliance, one of the organizations which supported development of Chickscope, is funded through NSF's Partnerships for Advanced Computational Infrastructure program.

Program for Persons with Disabilities. Rosie Talamantes, an industrial engineering major at New Mexico State University (NMSU) and single mother of two, is a student researcher doing computer programming work in support of molecular modeling at Los Alamos National Laboratory. She has been named a 1999 Employee of the Year by *Careers and the Disabled* magazine. Talamantes, a quadriplegic since 1987, wants to teach math following graduate school, mentors other disabled students by telephone or over the Internet, and has been a peer counselor within her community. Her activities and opportunities are part of a project at NMSU, sponsored by NSF's Program for Persons With Disabilities, which has established a regional alliance of 21 two- and four-year universities and community colleges in New Mexico, West Texas, and Oklahoma in order to alleviate the lack of representation in science, mathematics, engineering, and technology by students with disabilities.

Technology-Enabled Research Concepts in K-12 Classrooms. Use of technology in classroom settings and research on its application and effectiveness is an important component of NSF education research programs. For example, researchers in atmospheric sciences at the University of Michigan have developed and implemented a modular year-long program for middle school science known as ***One Sky, Many Voices*****.** Its content focus is on the weather, and through an Internet enabled CD-ROM, it is now being used in over 240 schools nationwide. It permits students to conduct inquiry-based projects in collaboration with students in other parts of the world. Students who participated in the project's activities consistently scored higher on standardized test items in the subject area than students who took more traditional classes. The easy to use technology works across platforms and is connected to the curriculum required by state and local authorities.

The **Interagency Education Research Initiative (IERI)**, supported by NSF, the Department of Education, and the National Institutes of Health, focuses on identifying education strategies that improve the teaching and learning of reading, mathematics and science from pre-kindergarten through grade 12. For example, at the University of Texas Health Center-Houston, an interdisciplinary study will use multiple interventions and assessment methods to address questions of how to best tailor, sequence and integrate early reading instruction to promote literacy. A particularly exciting component of this study involves the use of advanced brain imaging technology to track changes in neural function of students receiving different types of instruction as they learn to read. The results of this project will inform efforts aimed at the prevention, early identification, and remediation of early reading difficulties.