

Workforce Development for Teachers and Scientists

Funding Profile by Subprogram

(dollars in thousands)

	FY 2004 Comparable Appropriation	FY 2005 Original Appropriation	FY 2005 Adjustments	FY 2005 Comparable Appropriation	FY 2006 Request
Workforce Development for Teachers and Scientists					
Undergraduate Internships	3,607	3,483	-56 ^a	3,427	3,123
Graduate/Faculty Fellowships.....	1,930	3,060	-5 ^a	3,055	3,080
Pre-College Activities	895	1,117	0	1,117	989
Total, Workforce Development for Teachers and Scientists	6,432 ^b	7,660	-61	7,599	7,192

Public Law Authorizations:

Public Law 95-91, "Department of Energy Organization Act"

Public Law 103-62, "Government Performance and Results Act of 1993"

The Omnibus Energy Legislation: Sec. 995. Educational Programs in Science and Mathematics amends the Public Law 101-510, "DOE Science Education Enhancement Act"

Mission

The mission of the Workforce Development for Teachers and Scientists (WDTS) program is to provide a continuum of educational opportunities to the Nation's students and teachers of science, technology, engineering, and mathematics (STEM).

WDTS performs the following functions in support of its overall mission: (1) provides mentor-intensive research experiences at the national laboratories for undergraduate students to inspire commitments to the technical disciplines and pursue careers in science, technology, engineering and mathematics thereby helping our national laboratories and the Nation meet the demand for a well-trained scientific/technical workforce; (2) builds an interactive link between the national laboratories and the science-education community by providing mentor research experiences at the national laboratories to teachers and college faculty to enhance their content knowledge and research capabilities; and (3) encourages middle and high school students across the nation to share, demonstrate, and excel in math and the sciences, and introduces these students to the national laboratories and the opportunities available to them when they go to college.

Benefits

Through this unified program, WDTS can attract, train, and retain the talent needed to supply our national laboratories with the workforce it will need to execute the compelling science that the Office of Science (SC) will conduct in the coming years.

WDTS supports three science, technology and workforce development subprograms: 1) Undergraduate Internships, for a broad base of undergraduate students planning to enter STEM careers, including

^a Reflects a rescission in accordance with P.L. 108-447, the Consolidated Appropriations Act, 2005.

^b Includes a reduction of \$38,000 rescinded in accordance with P.L. 108-137, the Consolidated Appropriations Act, 2004.

teaching; 2) Graduate/Faculty Fellowships for STEM students, teachers, and faculty; and 3) Pre-College Activities for middle and high school students, the principle effort being the Middle and High School National Science Bowls. Each subprogram targets a different group of students and teachers to attract a broad range of participants to the programs and to expand the pipeline of students who will enter the STEM workforce. In this fashion, the subprograms use our national laboratories to meet the Department's needs, as well as a national need, for a well-trained scientific and technical workforce. The program also has a focus on professional development for teachers and faculty who often serve their students as the primary models and inspiration for entering the scientific and technical workforce.

Significant Program Shifts

On July 8, 2004, the Department of Energy (DOE) announced the Scientists Teaching and Reaching Students (STARS) education initiative to promote science literacy and help develop the next generation of scientists and engineers. In support of this effort, there is additional funding to both the Laboratory Science Teacher Professional Development (LSTPD) activity and to the Middle School Science Bowl in FY 2006. The components of the STARS initiative that involve educational outreach by national laboratory scientists and engineers to middle school students will be executed by the national laboratories through their respective workforce development/education offices.

The LSTPD activity is a 3 year commitment experience for K-14 teachers and faculty and was designed to add a cohort of 60 teachers each year. FY 2006 represents the third year of this program. The first cohort of 62 teachers began in FY 2004, the second cohort of approximately 28 teachers begins in FY 2005, and the third cohort of 15 teachers will begin in FY 2006. The LSTPD will run at five or more DOE national laboratories with about 105 participating STEM teachers, in response to the national need for science teachers who have strong content knowledge in the classes they teach. DOE national laboratories provide mentor-intensive, research-focused professional development where the teacher is immersed in the culture and world of science and technology. The multidisciplinary, team-centered, scientific culture of the national laboratories is an ideal setting for teachers to fully comprehend the science and technology principles they are asked to teach. More importantly, the extensive mentoring power of our laboratory scientists and their commitment to knowledge transfer are ideal means to establish a link between teachers, their classroom, and the scientific community. Armed with this knowledge and experience, teachers enter the classroom as genuine and effective representatives of the exciting world of science and technology. Teacher classroom performance and student commitment to STEM career paths will help measure the long-term impact of this program.

The Faculty Sabbatical activity, which is being initiated in FY 2005 for 12 faculty members from Minority Serving Institutions (MSI), will have five positions available in FY 2006. The Faculty Sabbatical is aimed at providing sabbatical opportunities to faculty members from MSIs to facilitate the entry of their faculty into the research funding mainstream. This activity is an extension of the successful Faculty and Student Teams (FaST) program where teams consisting of a faculty member and two or three undergraduate students, from colleges and universities with limited prior research capabilities, work with mentor scientists at a national laboratory to work on a research project that is formally documented in a paper or presentation.

In the FY 2006 request, the Pre-Service Teachers (PST) activity will be run at one national laboratory, as opposed to eight national laboratories in FY 2005, and students will be recruited from participating National Science Foundation (NSF) programs.

Supporting Information

As documented by a July 2001 DOE Inspector General report, the Department faces a critical and immediate shortage of scientific and technical staff sufficient to meet its mission requirements. In their report on “Recruitment and Retention of Scientific and Technical Personnel”, (DOE/IG-0512, July 2001, <http://www.ig.doe.gov/pdf/ig-0512.pdf>), GAO reported that “the Department was unable to recruit and retain critical scientific and technical staff in a manner sufficient to meet identified mission requirements. Based on their analysis of attrition and hiring since 1999, GAO determined that as of January 2001, the Department faced an immediate need for as many as 577 scientific and technical specialists. Further, if this trend continues, the Department could face a shortage of nearly 40% in these classifications within five years.” WDTS is addressing this shortfall by managing its current programs, and initiating target programs, that align with the mission of SC and the national laboratories.

The WDTS program provides a grade school through post-graduate school set of opportunities that are unified under the common belief that DOE national laboratories can provide unique training and professional development research experiences that enhance the technical skills and content knowledge in science and mathematics of teachers and students, strengthen their investigative expertise, inspire commitments to science and engineering careers, and build a link between the resources of the national laboratories and the science education community. These opportunities are complimentary to the efforts of other federal agencies, such as the NSF and the Department of Education, and provide support that might otherwise be unavailable to these agencies’ programs and students they serve.

Undergraduate Internships

Funding Schedule by Activity

(dollars in thousands)

	FY 2004	FY 2005	FY 2006	\$ Change	% Change
Undergraduate Internships					
Science Undergraduate Laboratory Internship	2,492	2,587	2,663	+76	+2.9%
Community College Institute of Science and Technology	605	423	430	+7	+1.7%
Pre-Service Teachers	510	417	30	-387	-92.8%
Total, Undergraduate Internships.....	3,607	3,427	3,123	-304	-8.9%

Description

The mission of the Undergraduate Internships subprogram is to continue the Department’s long-standing role of providing mentor-intensive research experiences at the national laboratories for undergraduate students to enhance their content knowledge in science and mathematics and their investigative expertise; and to inspire commitments to careers in science, engineering, and K-12 STEM teaching. Through providing a wide variety of college undergraduates the opportunity to work directly with many of the world’s best scientists and use the most advanced scientific facilities available, this program will expand the Nation’s supply of highly skilled scientists and engineers, especially in the physical sciences where the greatest demand lies because of a steady decline in U.S. citizens entering these fields.

The SC Program Goals will be accomplished not only through the efforts of the direct (GPRA Unit) programs but with additional efforts from the subprograms which support the GPRA Units in carrying out their mission. Undergraduate Internships performs three functions, as indicated in the Supporting Information, in support of the overall SC mission.

Benefits

The Undergraduate Internships subprogram provides a wide diversity of opportunities for undergraduate students to see and experience what a career in a national laboratory has to offer. It allows the national laboratories to have a broader and more skilled pool from which to draw employees. It also provides the laboratory mentors with a more enriching environment in which to conduct their research.

Supporting Information

The Undergraduate Internships subprogram contains three activities:

The Science Undergraduate Laboratory Internship (SULI) strengthens the students’ academic training and introduces them to the unique intellectual and research facility resources present at the national laboratories. Research internships are available during the spring, summer, and fall terms.

The Community College Institute (CCI) of Science and Technology provides a 10-week summer workforce development program through research experiences at several DOE national laboratories for highly motivated community college students. The CCI is targeted at underserved community college students who have not had an opportunity to work in an advanced science-research environment. It incorporates both an individually mentored research component and a set of enrichment activities that include lectures, classroom activities, career guidance/planning, and field trips.

Pre-Service Teachers (PST) is for undergraduate students who plan on pursuing a teaching career in science, technology, engineering, or mathematics. Students work with scientists or engineers on projects related to the laboratories' research programs. They also have the mentorship of a master teacher who is currently working in K-12 education as a teacher and is familiar with the research environment of a specific national laboratory.

FY 2004 Accomplishments

- WDTS has fully implemented an innovative, interactive Internet system for all SC national workforce development programs, to receive and process hundreds of student and teacher/faculty applications for summer, fall, and spring semester research appointments at participating DOE laboratories. The on-line application system is linked with an SC laboratory central processing center, called Education Link, and allows the students and researchers at the laboratories to select and match in research areas of common interest.
- Through special recruitment efforts, the Undergraduate Internships have attracted a diverse group of students using the electronic application. Over 9% of those submitting applications were from underrepresented groups. Approximately 48% of the applicants were females, and more than 6% were from low-income families. There were 462 internship appointments made in FY 2001, 277 in FY 2002, 569 in FY 2003, and 670 in FY 2004. All appointments are made through the on-line application process.
- In order to document and evaluate the quality of the research experience and the collaboration of the intern with their mentor researcher, the program publishes the “Journal of Undergraduate Research” containing full-length peer-reviewed research papers and abstracts of students’ research in the activity. All scientific research abstracts are graded to measure the quality of the students’ ability to prepare scientific manuscripts. A fourth edition was published in 2004, with 22 full-length papers and 422 abstracts. In 2004, more than 96% of all students in undergraduate research internships submitted abstracts and research papers. The students who published full-length papers presented their work at a poster session at the American Association for the Advancement of Science (AAAS) national meeting. Students have received awards at these events for their research and the communication of their accomplishments.
- The “Undergraduate Internships Program Guidebook” was revised. It is an invaluable tool for both students and laboratory research mentors as it describes the responsibilities, requirements, and outcomes that are associated with a successful internship. The guidebook contains formats and instructions for the written requirements, including scientific abstract, research paper, oral presentation, and poster; and instructions for an education module for the PST activity.
- CCI is open to students from all community colleges. In the summer of 2004, 88 community college students attended a 10-week mentor-intensive scientific research experience at several DOE national laboratories. About 22% of the participating students came from underrepresented groups in STEM disciplines; many were “non-traditional” students. Grades of abstracts for these students were statistically equal to those from the four-year program. Twelve community college students also participated with faculty members as part of a FaST.

Detailed Justification

(dollars in thousands)

FY 2004	FY 2005	FY 2006
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Science Undergraduate Laboratory Internship

(SULI)..... **2,492** **2,587** **2,663**

SULI supports a diverse group of students at our national laboratories in individually mentored research experiences. Through these unique and highly focused experiences these students will become a repository of talent to help the DOE meet its science mission goals. Students in the program: 1) apply on a competitive basis and are matched with mentors working in the students' fields of interest; 2) spend an intensive 10-16 weeks working under the individual mentorship of resident scientists; 3) produce an abstract and formal research paper; and 4) attend seminars that broaden their view of career options and help them understand how to become members of the scientific community. Activity goals and outcomes are measured based on students' research papers, students' abstracts, surveys, and outside evaluation. An undergraduate student journal is produced annually that publishes selected full research papers and all abstracts of students in the activity. Full research papers published in the journal are presented by the student authors at the annual national conference of the AAAS and the abstracts of their presentations are posted on the AAAS web site. The NSF collaborates with DOE to offer students in its undergraduate student programs access to individually mentored research internships that they would otherwise not have. This activity will ensure a steady flow of students with growing interest in science careers into the Nation's pipeline of workers in both academia and industry. A system is being refined to track students in their academic career paths. In FY 2004, with DOE, NSF and other leveraged support, 43 students participated in the spring semester program, 405 students participated in the summer, and about 30 students are expected in the fall semester program. The DOE contribution will support an estimated 345 students in FY 2005 and 358 students in FY 2006.

Community College Institute of Science and Technology (CCI)

605 **423** **430**

This activity is designed to address shortages, particularly at the technician and paraprofessional levels, and will help develop the workforce needed to continue building the Nation's capacity in critical areas for the next century. Since community colleges account for more than half of the entire Nation's undergraduate enrollment, this is a clear avenue to find and develop talented scientists and engineers. The CCI particularly targets students from under represented populations in the science and technology fields to increase the diversity of the workforce. The CCI provides a 10-week mentored research internship at a DOE national laboratory for highly motivated community college students. Students in the program: 1) apply on a competitive basis and are matched with mentors working in the students' field of interest; 2) spend an intensive ten weeks working under the individual mentorship of resident scientists; 3) produce an abstract and formal research paper; and 4) attend professional enrichment activities, workshops, and seminars that broaden their view of career options, help them understand how to become members of the scientific community, and enhance their communication and other professional skills. Activity goals and outcomes are measured based on students' research papers, students' abstracts, surveys, and outside evaluation. An ongoing undergraduate student journal was created to publish selected full research papers and all abstracts of students in this activity. CCI was originally a collaborative effort with DOE, its national laboratories, the American Association of Community Colleges, and specified member institutions. Through a Memorandum of Understanding with the NSF in FY 2001, undergraduate students in NSF programs (e.g., the Louis Stokes Alliance for

(dollars in thousands)

FY 2004	FY 2005	FY 2006
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Minority Participation and Advanced Technology Education program) are also participating in this activity. This allows NSF's undergraduate programs to include a community college internship in the opportunities they provide to students. The CCI program is now available to students from all community colleges.

In FY 2004, 88 students directly participated in this internship, with approximately 70 students participating in FY 2005 and 71 students participating in FY 2006.

Pre-Service Teachers (PST)..... 510 417 30

The PST activity is for students who are preparing for a teaching career in a STEM discipline. This effort is aimed at addressing the national need to improve content knowledge of STEM teachers prior to entering the teaching workforce. The NSF entered into a collaboration with SC on this activity in FY 2001. This allows NSF's undergraduate pre-service programs to include a PST internship in the opportunities they provide to students. Students in this program: 1) apply on a competitive basis and are matched with mentors working in the student's field of interest; 2) spend an intensive ten weeks working under the mentorship of master teachers and laboratory scientists to help maximize the building of content, knowledge, and skills through the research experience; 3) produce an abstract and an educational module related to their research and also may produce a research paper or poster or oral presentation; and 4) attend professional enrichment activities, workshops, and seminars that help students apply what they learn to their academic program and the classroom, and also to help them understand how to become members of the scientific community, and enhance their communication and other professional skills. Activity goals and outcomes are measured based on students' abstracts, education modules, surveys, and outside evaluation. In FY 2004, 63 students participated in this program. Approximately 69 students in FY 2005 and about 10 students in FY 2006 are expected to participate in the PST activity. The PST will be hosted at only one national laboratory in FY 2006 as compared to 12 in FY 2005. Within the FY 2006 request for WDTS, priority was given to sustaining the Faculty Sabbatical Fellowship, initiated in FY 2005, and to adding a very small number of teachers to the LSTPD. The PST internship was significantly reduced in FY 2006 to accommodate the overall WDTS priorities.

Total, Undergraduate Internships..... 3,607 3,427 3,123

Explanation of Funding Changes

FY 2006 vs. FY 2005 (\$000)

Undergraduate Internships

Science Undergraduate Laboratory Internship

The number of students participating in SULI increases by 13 students from 345 students in FY 2005 to 358 students in FY 2006. +76

FY 2006 vs. FY 2005 (\$000)

Community College Institute of Science and Technology

The number of students participating in CCI increases by 1 student, from 70 students in FY 2005 to 71 students in FY 2006. +7

Pre-Service Teachers

The number of students participating in the PST decreases by 59 students, from 69 students in FY 2005 to ten students in FY 2006. -387

Total Funding Change, Undergraduate Internships -304

Graduate/Faculty Fellowships

Funding Schedule by Activity

(dollars in thousands)

	FY 2004	FY 2005	FY 2006	\$ Change	% Change
Graduate/Faculty Fellowships					
Laboratory Science Teacher Professional Development.....	1,035	1,500	1,840	+340	+22.7%
Faculty and Student Teams	215	265	250	-15	-5.7%
Albert Einstein Distinguished Educator Fellowship	600	700	700	0	0.0%
Energy Related Laboratory Equipment	80	90	90	0	0.0%
Faculty Sabbatical Fellowship.....	0	500	200	-300	-60.0%
Total, Graduate/Faculty Fellowships	1,930	3,055	3,080	+25	+0.8%

Description

The mission of the Graduate/Faculty Fellowships subprogram is to build a link between the resources of the national laboratories and the science education community by providing mentor-intensive research experiences at the national laboratories to teachers and faculty to enhance their content knowledge in science and mathematics and their investigative expertise, and to enhance the research capabilities at academic institutions.

The SC Program Goals will be accomplished not only through the efforts of the direct (GRPA Unit) programs but with additional efforts from the subprograms which support the GPRPA Units in carrying out their mission. Graduate/Faculty Fellowships performs five functions, as indicated in the Supporting Information, in support of the overall SC mission.

Benefits

These Graduate/Faculty Fellowship activities bring in fresh ideas and a greater diversity of faculty and colleges interacting with the national laboratories.

Supporting Information

The Graduate/Faculty Fellowships subprogram contains five activities:

The Laboratory Science Teacher Professional Development (LSTPD) program addresses the Administration’s goal of a “qualified teacher in every classroom,” and supports the DOE’s education initiative—Scientists Teaching and Reaching Students (STARS). The program provides K-14 classroom teachers long-term, mentor-intensive professional development through scientific research opportunities at the national laboratories. The goal of the program is to improve teachers' content knowledge, student achievement in STEM, and numbers of students pursuing STEM careers. The desired outcome is that students will show increased involvement in STEM courses, extracurricular activities and pursuit of higher level STEM courses and ultimately show rising average scores on standardized tests. Teachers completing the initial laboratory summer experience will be provided monetary support to: help them extend what they have learned to their classes; connect students via classroom activities to ongoing national laboratory research; continue communication and collaboration with other participant teachers

and laboratory scientists; take subject enhancement trips to the laboratory; and, present their experiences at professional conferences and in publications.

The Faculty and Student Teams (FaST) program provides research opportunities at national laboratories to faculty and undergraduate students from colleges and universities, including community colleges, with limited prior research capabilities as well as institutions serving populations underrepresented in the fields of science, technology, engineering, and mathematics, particularly women and minorities. These opportunities are also extended to faculty from NSF funded institutions.

The Faculty Sabbatical Fellowship program is an extension of the successful FaST program. It provides a research fellowship for a faculty member from a Minority Serving Institution (MSI) to collaborate with resident scientists at a national laboratory for up to one year on research projects specific to the visiting professors' areas of investigation and the courses they teach. It is the extended stay at the laboratory, along with the concentrated support, that will enhance them as professors and help them better prepare and apply for grants from federal science agencies and other granting institutions.

The Albert Einstein Distinguished Educator Fellowship activity supports outstanding K-12 science and mathematics teachers, who provide insight, extensive knowledge, and practical experience to the legislative and executive branches. This activity is in compliance with the Albert Einstein Distinguished Educator Act of 1994, which gives the DOE responsibility for administering the activity of distinguished educator fellowships for elementary and secondary school mathematics and science teachers.

The Energy Related Laboratory Equipment (ERLE) activity grants available excess equipment to institutions of higher education for energy-related research.

FY 2004 Accomplishments

- The LSTPD program was implemented at seven national laboratories for 62 teachers. An outside evaluation team was brought in during the planning stages to design the evaluation component of the program.
- The innovative, interactive Internet system developed and implemented for all SC national workforce development programs to receive and process hundreds of student and teacher/faculty applications for summer, fall, and spring semester research appointments at participating DOE laboratories, was modified to include on-line applications for the LSTPD program. The automated system is virtually paperless and provides an excellent example of how the Internet can be used to streamline the operation of DOE's research participation programs. The on-line application system is linked with an SC laboratory central processing center called Education Link. This system enhances communication with the participants regarding their internships; contains pre- and post-surveys that quantify student knowledge, performance and improvement; and allows SC to measure program effectiveness and track students in their academic and career path, and to be a hosting site for publishing student papers, abstracts, and all activity guidelines.
- The Albert Einstein Distinguished Educator Fellowship activity placed four outstanding K-12 science, math, and technology teachers in Congressional offices and two at DOE, as directed by legislation. The National Aeronautics and Space Administration, the NSF, and the National Institute of Standards and Technology contributed funds to place six additional Einstein Fellows in those agencies.
- Five SC laboratories –Argonne, Brookhaven, Lawrence Berkeley, Oak Ridge and Pacific Northwest National Laboratories directly provided support for 31 FaST teams. The NSF has continued as a significant partner in this program and has helped to support these 31 teams. Faculty and students

from colleges and universities with limited prior research capabilities and those institutions serving populations underrepresented in the fields of science, engineering, and technology were part of a research team at a national laboratory. Over a 10 week summer visit to the laboratory, the faculty was introduced to new and advanced scientific techniques that contribute to their professional development and help them prepare their students for careers in science, engineering, computer sciences, and technology.

- One faculty member from a participating FaST team partnered with the Lawrence Berkeley National Laboratory in a grant application to the NSF and the partnership was awarded an Advanced Technology Education (ATE) grant.
- The FaST program has laid the foundation for the Faculty Sabbatical program, which will bring faculty from MSIs to national laboratories to enhance their research capabilities as well as the research capacity of their home institution. The Faculty Sabbatical provides support for up to a year of direct research with resident national laboratory scientists on research projects specific to their areas of investigation and courses they teach.

Detailed Justification

(dollars in thousands)

FY 2004	FY 2005	FY 2006
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Laboratory Science Teacher Professional Development (LSTPD).....

1,035 1,500 1,840

The National Commission on Mathematics and Science Teaching indicates that professional staff development is one of the most effective ways of improving the achievement of K-14 students. The national laboratories can play a significant role in providing carefully designed mentor-intensive training for science and math teachers that will allow them to more effectively teach; attract their students' interests to science, mathematics, and technology careers; and improve student achievement. Teachers apply on a competitive basis and are matched with mentors working in their subject fields of instruction. Selected teachers make a 3-year commitment to the LSTPD. Best practice research in teacher professional development indicates that change takes place over an extended period of time and that longer professional development is required. Approximately 62 teachers in FY 2004, 90 teachers in FY 2005 (up to 62 continuing from FY 2004 and the remainder new), and 105 teachers in FY 2006 (up to 90 continuing from FY 2004 and FY 2005, and the remainder new) will spend an intensive four to eight weeks at five or more national laboratories working under the mentorship of master teachers and laboratory mentor scientists to help build content knowledge research skills and a lasting connection with the scientific community through the research experience. Master teachers, who are expert K-14 teachers and adept in both scientific research experience at a national laboratory and scientific writing, will act as liaisons between the mentor scientists and the teacher researchers to help the teachers transfer the research experience to their classroom environments. Follow-on support is considered critical. Master teachers and other teacher participants receive an \$800 per week stipend, travel, and housing expenses. All teachers completing the initial immersion experience will be provided monetary support, which consists of approximately \$3,000 per year for the three years they are in the program, to purchase materials and scientific equipment, and to help them transfer their research experience to their classroom. Also, follow-on support will include returning to the laboratory in the first year for additional training sessions of approximately one week, and long-term support in following years through communication with other participants and laboratory scientists, more return trips to the national

(dollars in thousands)

FY 2004	FY 2005	FY 2006
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laboratory, and support to present their experience at teaching conferences and publications. Outside evaluation of program effectiveness includes visits to participant teachers' schools and long-term impact of the program on student achievement. Success of this research experience relies on proper placement of each participant to match their professional developmental needs and the follow-on interaction between the teachers and the national laboratories. In FY 2004, this program was initiated at seven national laboratories. The LSTPD supports the DOE's STARS initiative designed to enhance the training of America's mathematics and science teachers; grow students' interest in science and math, especially in the critical middle school years; and draw attention to the women and men who have done DOE science so very well—and thereby encourage young people and prospective teachers to pursue careers in math and science.

Faculty and Student Teams (FaST) 215 265 250

FaST activities at SC Laboratories are being conducted in collaboration with the NSF. Faculty from colleges and universities with limited prior research capabilities and those institutions serving women, minorities, and other populations under represented in the fields of science, engineering, and technology are encouraged to take advantage of the FaST opportunity to prepare students for careers in science, engineering, computer sciences, and technology and for their own professional development. In the first year (FY 2001) of this program, there was one FaST. In part because of increasing support from the NSF, there were six teams in FY 2002, 23 teams in FY 2003, 31 teams in FY 2004, and 33 in FY 2005. In FY 2006, with similar support from NSF, it is projected that there will be about 34 FaST teams. In order to sustain the Faculty Sabbatical Fellowship program, and to add a small number of teachers to the LSTPD fellowship, the FY 2006 DOE contribution is reduced by \$15,000 from the FY 2005 level. FaST is a very productive and over-subscribed activity among the laboratory scientists and faculty members and has enjoyed wide support from the national laboratories. It provides an opportunity for faculty to advance their scientific expertise through a close relationship with a national laboratory. Three teams have received peer-reviewed publications that were published in the *Journal of Undergraduate Research*.

Albert Einstein Distinguished Educator Fellowship.... 600 700 700

The Albert Einstein Fellowship Awards for outstanding K-12 science, mathematics, and technology teachers continues to be a strong pillar of the program for bringing real classroom and education expertise to our education and outreach activities. Albert Einstein Fellows bring to Congress, DOE, and other Federal agencies the extensive knowledge and experience of classroom teachers. They provide practical insights and “real world” perspectives to policy makers and program managers. The Einstein Fellowship has been a valuable professional growth opportunity for the teachers, as they return to their education field with knowledge of federal resources and an understanding of national education issues. In FY 2006, 13 fellows are supported, the same as FY 2005.

Energy Related Laboratory Equipment (ERLE)..... 80 90 90

The ERLE grant activity was established to provide available excess used equipment to institutions of higher education for energy-related research. Through the Energy Asset Disposal System, DOE sites identify laboratory equipment that is then listed on the ERLE website, which is maintained at the Office of Scientific and Technical Information and updated several times a week. Colleges and universities can search for equipment of interest to them and apply via the website. DOE property managers approve or

(dollars in thousands)

FY 2004	FY 2005	FY 2006
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disapprove the applications. The equipment is free; however, the receiving institution pays all shipping costs.

Faculty Sabbatical Fellowship	0	500	200
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The Faculty Sabbatical provides support for up to a year of direct research with resident national laboratory scientists on research projects specific to their areas of investigation and courses they teach. The Faculty Sabbatical activity is designed for each MSI faculty member to work with a national laboratory scientist on a well funded, focused research project of the faculty member's choice. This will not only develop the faculty members' scientific expertise, but also develop their abilities and support their efforts to apply for and receive grants from SC and other granting institutions. Since MSI faculty salaries are comparatively low, their home institutions monetary support is generally insufficient to allow an extended stay at a national laboratory. This sabbatical would match each faculty member's home institution contribution, making their salary more comparable to the level of a national laboratory scientist. This would enable faculty to spend an academic year working on research projects of their interest. It would enhance their research capabilities, adding to their own teaching and research strength, as well as the research capacity of their home institution. Each faculty member can bring their students to the national laboratories, ultimately increasing workforce numbers and diversity. It is the extended stay at the national laboratory, along with the concentrated support from the resident scientists that will enhance them as professors and better prepare them to apply for and receive grants from federal science agencies and other granting institutions. In FY 2005, the initial year of the Faculty Sabbatical Fellowship activity will provide sabbatical research opportunities for 12 faculty members from MSIs to enhance their research capabilities as well as the research capacity of their home institution. Support for this new activity is maintained in FY 2006, but at a reduced level within the overall WDTS program. In FY 2006, there will be five Faculty Sabbatical appointments.

Total, Graduate/Faculty Fellowships	1,930	3,055	3,080
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Explanation of Funding Changes

FY 2006 vs. FY 2005 (\$000)

Graduate/Faculty Fellowships

Laboratory Science Teacher Professional Development

This increase allows an evaluation of results for the LSTPD activity and supports 15 additional teachers in FY 2006.	+340
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Faculty and Student Teams

The number of SC funded FaST teams participating in a 10-week mentored research experience at a DOE national laboratory is reduced by one (15 in FY 2005 and 14 in FY 2006). However, based upon past support from NSF, it is projected that the program will be able to support 1 additional team in FY 2006.	-15
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FY 2006 vs. FY 2005 (\$000)

Faculty Sabbatical Fellowship

Within the overall reduction in the FY 2006 WDTS program, the Faculty Sabbatical Fellowships are reduced from 12 in FY 2005 to 5 in FY 2006 for faculty members from MSIs.

-300

Total Funding Change, Graduate/Faculty Fellowships.....

+25

Pre-College Activities

Funding Schedule by Activity

(dollars in thousands)

	FY 2004	FY 2005	FY 2006	\$ Change	% Change
Pre-College Activities					
National Science Bowl®	725	900	739	-161	-17.9%
Middle School Science Bowl.....	170	217	250	+33	+15.2%
Total, Pre-College Activities.....	895	1,117	989	-128	-11.5%

Description

Beyond providing students an opportunity to interact with the scientific community, an additional goal of the middle and high school Science Bowl is to provide opportunities for students interested in science and math to share and demonstrate their talents outside the classroom in an interactive manner that validates their accomplishments and encourages future science and math studies.

The SC Program Goals will be accomplished not only through the efforts of the direct (GPRA Unit) programs but with additional efforts of the direct (GPRA Unit) programs but with additional efforts from the subprograms which support the GPRA Units in carrying out their mission. Pre-College Activities performs two functions, as indicated in the Supporting Information, in support of the overall SC mission.

Benefits

These Pre-College Activities introduce middle and high school students to the national laboratory system and the available opportunities they may wish to participate in when they go to college.

Supporting Information

The Pre-College Activities subprogram contains two activities which provide an avenue of enrichment, enlightenment, inspiration, and reward through academic science achievement:

The National Science Bowl® is a prestigious educational event that continues to grow in reputation among students, educators, science coaches, and volunteers as a very important educational event and academic tournament. It is a “grass roots” tournament where over 1,800 high schools from all across the nation participate in regional events and where each regional event sends a team to the national event. The regional and national events are primarily volunteer programs where several thousand people dedicate weeks of their time to run and judge educational events and be involved with bright, enthusiastic students who attend science and technology seminars and compete in a verbal forum to solve technical problems and answer questions in all branches of science and math. High school teams also design, build, and race hydrogen fuel cell model cars. Since its inception, more than 90,000 high school students have participated in regional tournaments leading up to the national event. At the national event, students meet numerous DOE and non-DOE scientists and are given a rare chance to learn about the wide variety of careers that scientists in all fields pursue.

The Middle School Science Bowl attracts students at the most critical stage of their academic development. In support of the DOE’s STARS initiative, the Middle School Science Bowl will help create a new generation of scientists who will achieve the scientific breakthroughs and technological

advances so essential to our future security and prosperity. The emphasis at this grade level will be on discovery and hands-on activities such as designing, building, and racing model hydrogen fuel cell cars. Students also answer questions in the life and physical sciences and mathematics.

FY 2004 Accomplishments

DOE’s National Science Bowl® hosted more than 12,000 high school students in the 64 regional science bowl events.

- The Middle School Science Bowl, initiated in FY 2002 with 8 teams, was expanded to 20 regional sites in FY 2004. The national event in Golden, Colorado, is hosted by the National Renewable Energy Laboratory and the Colorado School of Mines. The event has two main activities: 1) a science and mathematics academic question and answer forum; and 2) a hands-on activity sponsored by General Motors, where each team designs, builds and races a scale-model hydrogen fuel cell car. Teachers are provided a day-long seminar in Hydrogen fuel cells and the Hydrogen economy.
- Saturday morning science seminars were expanded in FY 2004 to include an entire day, at the National Science Bowl® weekend, introducing students to many contemporary issues and findings in contemporary scientific research. These seminars have featured world class scientists and Nobel laureates.
- National Science Bowl® awards were expanded in FY 2004 to include a wide variety of academic awards to the top 18 teams and a Civility Award sponsored by IBM.
- In FY 2004, 16 of the 64 teams took part in designing, building, and racing cars under the Hydrogen Fuel Cell Model Car Challenge that was added to National Science Bowl® in FY 2003. Eight of these teams raced in the stock category and the other eight in the hill climb. Awards were presented to the top teams in this event.

Detailed Justification

(dollars in thousands)

FY 2004	FY 2005	FY 2006
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National Science Bowl® **725** **900** **739**

The National Science Bowl® is one of the few nationally recognized prestigious academic events for high school students. The students answer questions on scientific topics in astronomy, biology, chemistry, mathematics, and physics. In 1991, DOE developed the National Science Bowl® to encourage high school students from across the Nation to excel in mathematics and science and to pursue careers in those fields. The National Science Bowl® provides the students and teachers a forum to receive national recognition for their talent and hard work. The National Science Bowl® includes an entire day of scientific seminars, a set of model car competitions based upon the hydrogen economy of the future and an academic competition. Students participating in the National Science Bowl® will now be tracked to see the long-term impact on their academic and career choices.

The regional and national events are all primarily volunteer programs where several thousand people dedicate a few weeks of their time to organize and judge educational events and be involved with bright, enthusiastic high school students.

(dollars in thousands)

FY 2004	FY 2005	FY 2006
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Middle School Science Bowl..... **170** **217** **250**

It is well recognized that the middle school years are the most productive time to exert an effort to attract students to science and math subjects. There are two events at the Middle School Science Bowl: an academic mathematics and science forum, and an alternative energy model car race. The academic competition is a fast-paced question and answer contest where students answer questions about earth, life, physical, and general sciences and mathematics. The model alternative energy car competition challenges students to design, build, and race model hydrogen fuel cell cars in order to help them understand the future energy challenges that our nation is facing. Students who win in regional events will then enjoy a trip to a national laboratory and participate in a final three-day event that will be designed to capture their interest and reward them for their hard work.

In FY 2006, 24 teams will attend and participate in the National event, the same as the FY 2005 level.

Total, Pre-College Activities **895** **1,117** **989**

Explanation of Funding Changes

FY 2006 vs. FY 2005 (\$000)

Pre-College Activities

National Science Bowl®

The National Science Bowl® will support 66 teams (a decrease of 2 teams from FY 2005), but will continue to provide a whole day of scientific seminars and workshops for the students. DOE provides all funding for the teams to attend the National finals..... -161

Middle School Science Bowl

The increased funding will cover the cost for 24 Middle School Science Bowl teams to attend the National finals. +33

Total Funding Change, Pre-College Activities **-128**

