

Workforce Development for Teachers and Scientists

Funding Profile by Subprogram

(dollars in thousands)

	FY 2003 Comparable Appropriation	FY 2004 Original Appropriation	FY 2004 Adjustments	FY 2004 Comparable Appropriation	FY 2005 Request
Workforce Development for Teachers and Scientists					
Undergraduate Internships.....	3,614	3,768	-38 ^a	3,730	3,650
Graduate/Faculty Fellowships	903	1,900	0	1,900	3,110
Pre-College Activities	875	802	0	802	900
Subtotal, Workforce Development for Teachers and Scientists.....	5,392	6,470	-38	6,432	7,660
Less Use of Prior Year Balances.	0	-74	0	-74	0
Total, Workforce Development for Teachers and Scientists.....	5,392 ^b	6,396	-38	6,358	7,660

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 program is to provide a continuum of opportunities to the Nation's students and teachers of science, technology, engineering and mathematics (STEM).

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 will implement in the coming years.

The Workforce Development for Teachers and Scientists program supports three science, technology and workforce development subprograms: 1) Undergraduate Internships, for a broad base of undergraduate students planning to enter STEM careers, including teaching; 2) Graduate/Faculty Fellowships for STEM students, teachers, and faculty; and 3) Pre-College Activities for middle and high school students,

^a Excludes \$37,736 for a rescission in accordance with the Consolidated Appropriations Act, 2004, as reported in conference report H.Rpt. 108-401, dated November 25, 2003.

^b Excludes \$35,277 for a rescission in accordance with Consolidated Appropriations Resolution, FY 2003.

the principle effort being the National Science Bowl. Each subprogram targets a different group of students and teachers to attract as broad a 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 own, 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

- In FY 2005, the Laboratory Science Teacher Professional Development activity will run at five or more DOE National Laboratories with about 90 participating STEM teachers, in response to the national need for science teachers who have strong content knowledge in the classes they teach. The 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, each teacher could enter the classroom as a genuine effective representative 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.
- A new Faculty Sabbatical activity, proposed in FY 2005, is aimed at providing sabbatical opportunities to 12 faculty members from minority serving institutions (MSIs) to facilitate the entry of their faculty into the research funding mainstream. This proposed 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 complete a research project that is formally documented in a paper or presentation.

Supporting Information

As documented by a July 2001 DOE's Inspector General, the Department faces a critical and immediate shortage of scientific and technical staff sufficient to meet its mission requirements. Further, unless current trends are reversed the Department could, within less than five years, face a 40 percent shortage in these job function areas. The Office of Workforce Development is addressing this shortfall by managing its current programs, and initiating target programs, that align with the mission of SC and the Laboratories.

Our programs provide a grade school through post-grad school set of opportunities that are unified under the common belief that Department of Energy (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 National Science Foundation, 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 2003	FY 2004	FY 2005	\$ Change	% Change
Undergraduate Internships					
Science Undergraduate Laboratory Internship.....	2,503	2,615	2,650	+35	+1.3%
Community College Institute of Science and Technology	601	605	560	-45	-7.4%
Pre-Service Teachers.....	510	510	440	-70	-13.7%
Total, Undergraduate Internships	3,614	3,730	3,650	-80	-2.1%

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, their investigative expertise, and inspire commitments to careers in science and 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.

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” 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.

Accomplishments

- Workforce Development has fully implemented an innovative, interactive Internet system for all Office of Science 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.
- This system enhances communication with the participants regarding their internships, contains pre- and post-surveys that quantify student knowledge, performance and improvement, allows SC to measure program effectiveness, track students in their academic and career path, and be a hosting site for publishing student papers, abstracts and all activity guidelines. This system also provides valuable data on the quality of experiences and provides various metrics for outside evaluators to access the impact of the program.
- Through special recruitment efforts, the Science Undergraduate Laboratory Internship (SULI) has attracted a diverse group of students using the electronic application. Over 20 percent of those submitting applications were from under-represented groups. Approximately 40 percent of the applicants were females, and more than 25 percent were from low-income families. In the summers of 2000 through 2003, about 500 appointments were made each year 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 third edition was published in 2003, with 15 full-length papers and 488 abstracts. In 2003, more than 95% 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 program has revised its *Undergraduate Internships Program Guidebook*. The guidebook is an invaluable tool for both students and laboratory research mentors as it describes the responsibilities, requirements, and outcomes that are to be accomplished to have a successful internship. Contained therein are formats and instructions for the written requirements, including scientific abstract, research paper, oral presentation, and poster; and instructions for an education module for the Pre-Service Teachers.
- The DOE Community College Institute of Science and Technology (CCI) is open to students from all community colleges. In the summer of 2003, 81 community college students attended a 10-week mentor-intensive scientific research experience at several DOE National Laboratories. Almost 60

percent 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 4 year program.

Detailed Justification

(dollars in thousands)

	FY 2003	FY 2004	FY 2005
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Science Undergraduate Laboratory Internship..... 2,503 2,615 2,650

The Science Undergraduate Laboratory Internship (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 comprise a repository of talent to help the DOE meet its science mission goals. The paradigms of the activity are: 1) students apply on a competitive basis and are matched with mentors working in the students’ fields of interest; 2) students spend an intensive 10-16 weeks working under the individual mentorship of resident scientists; 3) students must each produce an abstract and formal research report; 4) students attend seminars that broaden their view of career options and help them understand how to become members of the scientific community; and 5) 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 American Association for the Advancement of Science (AAAS) and the abstracts of their presentations are posted on the AAAS web site. The National Science Foundation (NSF) began a collaboration with this activity as of FY 2001 to offer students in its undergraduate student programs access to individually mentored research internships that they would otherwise not have. The 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 2003, 25 students participated in the Spring semester program, 336 students participated in the summer, and 19 students in the fall semester program. An estimated 370 students in FY 2004 and 360 students in FY 2005 will participate in the Science Undergraduate Laboratory Internship.

Community College Institute of Science and Technology 601 605 560

The Community College Institute (CCI) of Science and Technology was originally a collaborative effort between DOE and its National Laboratories with the American Association of Community Colleges and specified member institutions. Through a recent Memorandum of Understanding with the NSF, undergraduate students in NSF programs (e.g., Lewis Stokes Alliance for Minority Participation and Advanced Technology Education program) are also participating in this activity and in FY 2002 the CCI was made available to students from all community colleges. This allows students in NSF-funded programs access to advanced laboratories, which would otherwise be unavailable to them, to perform research that will advance their STEM careers. 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 Institute provides a ten-week

(dollars in thousands)

FY 2003	FY 2004	FY 2005
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mentored research internship at a DOE National Laboratory for highly motivated community college students. The paradigms of the activity are: 1) students apply on a competitive basis and are matched with mentors working in the students' field of interest; 2) students spend an intensive 10 weeks working under the individual mentorship of resident scientists; 3) students must each produce an abstract and formal research report; 4) students 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; and 5) activity goals and outcomes are measured based on students' research papers, students' abstracts, surveys and outside evaluation. An undergraduate student journal was created to publish selected full research papers and all abstracts of students in this activity. The National Science Foundation entered into a collaboration with the Office of Science on this activity in FY 2001. This allows NSF's undergraduate programs to include a community college internship in the opportunities they provide to students. In FY 2003, 81 students directly participated in this internship. A similar number is expected in FY 2004 and in FY 2005 there will be approximately 73 students. The decrease in the number of students in the Undergraduate Research Internships subprogram is because additional funding was provided to: (a) Faculty and Students Teams, (b) Albert Einstein Distinguished Educator Fellowship and (c) US First Robotics [per FY 2004 Appropriations language].

Pre-Service Teachers	510	510	440
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The Pre-Service Teachers 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 paradigms of the activity are: 1) students apply on a competitive basis and are matched with mentors working the student's field of interest; 2) students spend an intensive 10 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) students must produce an abstract and an educational module related to their research and may also produce a research paper or poster or oral presentation; 4) students 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; and 5) activity goals and outcomes are measured based on students' abstracts, education modules, surveys and outside evaluation. In FY 2003, 65 students are participating in this program. Approximately 80 students in FY 2004 and 68 students in FY 2005 are expected to participate in the Pre-Service Teachers activity. The decrease in the number of students in the Undergraduate Research Internships subprogram is because additional funding was provided to: (a) Faculty and Students Teams, (b) Albert Einstein Distinguished Educator Fellowship and (c) US First Robotics [per FY 2004 Appropriations language].

Total, Undergraduate Internships	3,614	3,730	3,650
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Explanation of Funding Changes

FY 2005 vs. FY 2004 (\$000)

Science Undergraduate Laboratory Internship

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| ▪ This increase allows Science Undergraduate Laboratory Internship (SULI) students to attend the American Association for the Advancement of Science national meeting. The number of students in SULI decreases by 10 from 370 in FY 2004..... | +35 |
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Community College Institute of Science and Technology

- | | |
|--|-----|
| ▪ The number of students in the Community College Institute of Science and Technology decreases by 7 from 80 in FY 2004..... | -45 |
|--|-----|

Pre-Service Teachers

- | | |
|---|-----|
| ▪ The number of students participating in the Pre-Service Teachers activity decreases by 12 from 80 in FY 2004..... | -70 |
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Total Funding Change, Undergraduate Internships	-80
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Graduate/Faculty Fellowships

Funding Schedule by Activity

(dollars in thousands)

	FY 2003	FY 2004	FY 2005	\$ Change	% Change
Graduate/Faculty Fellowships					
Laboratory Science Teacher Professional Development	60	1,000	1,500	+500	+50.0%
Faculty and Student Teams.....	180	210	320	+110	+52.4%
Albert Einstein Distinguished Educator Fellowship.....	588	600	700	+100	+16.7%
Energy Related Laboratory Equipment	75	90	90	+0	0.0%
Faculty Sabbatical Fellowship.....	0	0	500	+500	--
Total, Graduate/Faculty Fellowships.....	903	1,900	3,110	+1,210	+63.7%

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, their investigative expertise and to enhance the research capabilities at academic institutions.

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 program addresses the Administration's goal of a "qualified teacher in every classroom." The program provides K-14 classroom teachers long-term, mentor-intensive professional development through scientific research opportunities at the National Laboratories. The program will improve: teachers' content knowledge; student achievement in science, technology, engineering and mathematics (STEM); and numbers of students pursuing STEM careers. 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; support to connect students via classroom activities to ongoing national laboratory research; support for continuing communication and collaboration with

other participant teachers and laboratory scientists; subject enhancement trips to the laboratory; and support to present their experiences at professional conferences and in publications.

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

The Faculty Sabbatical Fellowship program is an extension of the successful Faculty and Student Teams program. It provides a research fellowship where a faculty member may 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 (signed into law in November 1994). The law gives 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 was established by the Department of Energy (DOE) to grant available excess equipment to institutions of higher education for energy-related research.

Accomplishments

- An innovative, interactive Internet system has been developed and implemented for all Office of Science 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 automated system is virtually paperless and provides an excellent example of how the Internet can be used to streamline the operation of the Department'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, 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 National Science Foundation, and the National Institute of Standards and Technology contributed funds to place seven additional Einstein Fellows in those agencies.
- Five Office of Science laboratories – Argonne National Laboratory, Brookhaven National Laboratory, Lawrence Berkeley National Laboratory, Oak Ridge National Laboratory and Pacific

Northwest National Laboratory directly provided support for 12 Faculty and Student Teams. In collaboration with the National Science Foundation, this number was leveraged to support a total of 23 teams in FY 2003. Faculty and students from colleges and universities with limited prior research capabilities and those institutions serving populations, women, and minorities underrepresented in the fields of science, engineering, and technology were part of a research team at a National Laboratory. Over a ten week summer visit to the laboratory, the faculty were introduced to new and advanced scientific techniques that will help them prepare their students for careers in science, engineering, computer sciences and technology and their own professional development.

Detailed Justification

(dollars in thousands)

FY 2003	FY 2004	FY 2005
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Laboratory Science Teacher Professional Development

60 1,000 1,500

The *National Commission on Mathematics and Science Teaching* and numerous other studies indicate 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. The paradigms of the pilot "*Laboratory Science Teacher Professional Development*" activity are: 1) Teachers apply on a competitive basis and are matched with mentors working in their subject fields of instruction; 2) *approximately 60 teachers per year in FY 2004 and 90 in FY 2005 will spend an intensive 4 to 8 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*; 3) follow-on support is considered critical. Master teachers and other teacher participants receive an \$800/week stipend, travel and housing expenses. All teachers completing the initial immersion experience will be provided monetary support, which consists of approximately \$3,000 to *purchase materials and scientific equipment*, to help them transfer their research experience to their classroom. Follow-on support also will include: returning to the laboratory in the first year for *additional training sessions* of approximately 1 week; and *long-term support* in following years through communication with other participants and laboratory scientists, more *return trips* to the National Laboratory, and support to *present their experience at teaching conferences and publications*; and 4) *outside evaluation* of program effectiveness including visits to participant teachers' schools and long term impact of the program on student achievement. Success of this research experience relies on two elements: 1) proper placement of each participant to match their professional developmental needs and, 2) the follow-on interaction between the teachers and the National Laboratories. In FY 2004, the program will be initiated at five or more National Laboratories.

(dollars in thousands)

FY 2003	FY 2004	FY 2005
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Faculty and Student Teams 180 210 320

Faculty and Student Teams (FaST) activities at the Department of Energy, Office of Science Laboratories are being conducted in collaboration with the National Science Foundation. Faculty from colleges and universities with limited prior research capabilities and those institutions serving women, minorities, and other populations underrepresented 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. The first year (FY 2001) of this program there was one Faculty and Student Team. In collaboration with National Science Foundation, there were 6 teams in FY 2002 and 23 teams in FY 2003. This 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.... 588 600 700

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.

Energy Related Laboratory Equipment 75 90 90

The “Energy Related Laboratory Equipment” (ERLE) grant activity was established by the Department of Energy (DOE) 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 disapprove the applications. The equipment is free; however, the receiving institution pays all shipping costs.

Faculty Sabbatical Fellowship 0 0 500

In FY 2005, the Faculty Sabbatical Fellowship activity will provide sabbatical research opportunities for 12 faculty members from minority serving institutions 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. The Faculty Sabbatical activity is designed for each minority serving institution (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 the Office of Science and other granting institutions. Each faculty member would receive

(dollars in thousands)

FY 2003	FY 2004	FY 2005
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half of their sabbatical support from their home institutions. Since their salaries are comparatively low, this insufficient level of monetary support prevents them from an extended stay at a National Laboratory. This sabbatical would match each faculty member's home institution contribution, bringing the sabbatical salary level 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.

Total, Graduate/Faculty Fellowships	903	1,900	3,110
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Explanation of Funding Changes

FY 2005 vs. FY 2004 (\$000)

Laboratory Science Teacher Professional Development

- This allows an evaluation of results for the Laboratory Science Teacher Professional Development activity and supports 30 additional teachers in FY 2005..... +500

Faculty and Student Teams

- This allows an increase of four additional Faculty and Student Teams, compared to 16 in FY 2004, to participate in a 10 week mentored research experience at a DOE National Laboratory. +110

Albert Einstein Distinguished Educator Fellowship

- Increase the number of Einstein Fellowships from 12 to 13 and increase their stipends by 10% per Fellow to remain in step with rapidly rising costs of living in the Washington D.C. area. +100

Faculty Sabbatical Fellowship

- Initiate the Faculty Sabbatical pilot for 12 faculty members from minority serving institutions (MSIs). For faculty from MSIs to effectively compete for and receive research grants, they must be well trained in their science and fully adept in not only understanding where the cutting edge science is, but also how to actually apply for and receive grants. Typically MSIs do not have the infrastructure or the experienced faculty to enter and succeed in this highly competitive arena. This full sabbatical experience would allow faculty from these under-represented

FY 2005 vs. FY 2004 (\$000)

institutions to become fully engaged in their respective fields of research and access to the support structure of the National Laboratories, which will provide them with the expertise and experience to apply for and receive federally and non-federally funded research grants.....

+500

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

+1,210

Pre-College Activities

Funding Schedule by Activity

(dollars in thousands)

	FY 2003	FY 2004	FY 2005	\$ Change	% Change
Pre-College Activities					
National Science Bowl	725	702	750	+48	+6.8%
Middle School Science Bowl.....	150	100	150	+50	+50.0%
Total, Pre-College Activities	875	802	900	+98	+12.2%

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.

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[®]” activity 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 about 68 regional events and where each regional 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. The emphasis at this grade level will be on discovery and hands-on activities such as designing, building and racing model solar cars. Students also answer questions in the life and physical sciences and mathematics.

Accomplishments

- Two additional regional competitions were held in FY 2003 in conjunction with DOE’s National Science Bowl®. More than 12,000 high school students participated in the 67 regional science bowl events.
- A pilot Middle School Science Bowl was added in FY 2002, bringing eight teams to Washington, DC for the National event. In 2003, the activity was expanded to 16 regional sites, including some Jr. Solar Sprint sites. The National Event is hosted by the National Renewable Energy Laboratory in Golden, Colorado. 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 solar car and teachers are provided a day-long seminar in Hydrogen fuel cells and the Hydrogen economy.
- Saturday morning science seminars were expanded 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 to include a wide variety of academic awards to the top 18 teams and a Civility Award sponsored by IBM.
- In FY 2003, the Hydrogen Fuel Cell Model Car Challenge was added to National Science Bowl. Ten of the 67 teams took part in designing, building and racing their cars. Awards were presented to the top teams in this event.
- To accommodate the additional activities and events, an additional day was added in FY 2003.

Detailed Justification

(dollars in thousands)

FY 2003	FY 2004	FY 2005
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National Science Bowl..... **725** **702** **750**

SC will manage and support the National Science Bowl® for high school students from across the country for DOE. Since its inception, more than 90,000 high school students have participated in this event. The National Science Bowl® is a prestigious academic event among teams of high school students who: answer questions on scientific topics in astronomy, biology, chemistry, mathematics, physics, earth and general science; participate in various hands-on science activities; and attend seminars on contemporary issues in science. 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. An entire day of Saturday seminars in the latest scientific topics and the hydrogen fuel cell challenge has recently been added to the National Science Bowl® weekend. Selected teams build and race hydrogen fuel cell cars. 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 nationals 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, enthusiast middle and high school students.

(dollars in thousands)

FY 2003	FY 2004	FY 2005
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In FY 2005, an additional \$48,000 will allow 68 teams (an additional 2 regional sites over the FY 2004 level) to participate. Without this funding, these additional students will not participate in these events, activities and seminars.

Middle School Science Bowl.....	150	100	150
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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 science, life science, physical science, mathematics, and general science. The model alternative energy car competition challenges students to design, build, and race alternative energy model 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 2005, an additional \$50,000 will allow 24 teams (an additional 4 regional sites over the FY 2004 level) to attend and participate in the National event. Without this additional funding, these middle school students will not have this opportunity to compete in the regional events.

Total, Pre-College Activities	875	802	900
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Explanation of Funding Changes

FY 2005 vs. FY 2004 (\$000)

National Science Bowl

- This is to increase the number of National Science Bowl teams by 2 and to also provide a whole day of scientific seminars and workshops for the students. DOE provides all funding for the teams to attend the National finals. +48

Middle School Science Bowl

- This is to increase the number of participating Middle School Science Bowl teams to 24 from 20. DOE provides all funding for the teams to attend the National finals..... +50

Total Funding Change, Pre-College Activities	+98
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