

Stimulating Science Education:

NIH Summer Research Program Engages Students and Teachers in Science



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Federation of American Societies for Experimental Biology



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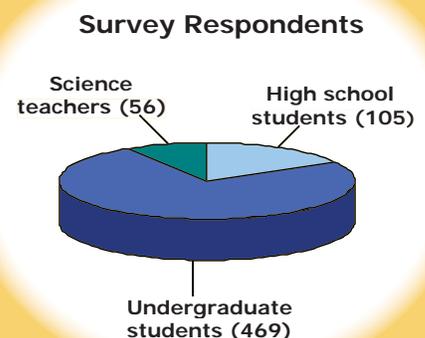
With funding from the American Recovery and Reinvestment Act (ARRA) of 2009, the National Institutes of Health (NIH) provided jobs and valuable research experiences to thousands of people across the country. As part of this initiative, NIH-funded investigators were able to bring students and teachers into their laboratories for the summer. A survey of program participants conducted by the Federation of American Societies for Experimental Biology (FASEB) found that in addition to creating jobs and advancing research, the program encouraged students to pursue health-science careers and provided learning and professional development opportunities to science educators.

Providing Jobs, Advancing Research

The primary goal of the Recovery Act was to jumpstart the American economy by creating and preserving jobs while advancing national priorities, such as improving health and education. NIH allocated \$28 million of its ARRA funds for the Summer Research Experiences For Students and Science Educators program¹, funding nearly 3,000 summer jobs in 2009, including 427 positions for high school students, 2,132 for college students, and 399 for science teachers. For the vast majority of the more than 600 respondents to the FASEB survey, these jobs were new: only 23% of the undergraduates and 4% of the high school students who responded had previously worked in the labs in which they conducted their summer research.

Engaging Future Scientists

The majority of the 105 high school students and 469 undergraduates responding to the survey were newcomers to the research environment. Over half (54%) never participated in a structured opportunity to conduct scientific research before the start of the NIH program. Virtually all of the high school students (98%) planned to attend college, and 82% of those bound for college intended to major in a science-related field. Undergraduate students came from a range of disciplines, from physics to the humanities, but most undergrads (69%) were majoring in the biological and health sciences (including psychology and behavioral sciences). Chemistry (13%) and interdisciplinary studies (7%) were the second and third most common majors. Like their high school counterparts, nearly all undergraduates (95%) had their sights set on a higher degree: many hoped to obtain medical (44%), research doctorate (28%), or master's degrees (16%) after completing college. Among those planning master's- or PhD-level education, 87% indicated that the training would be in a science-related field.



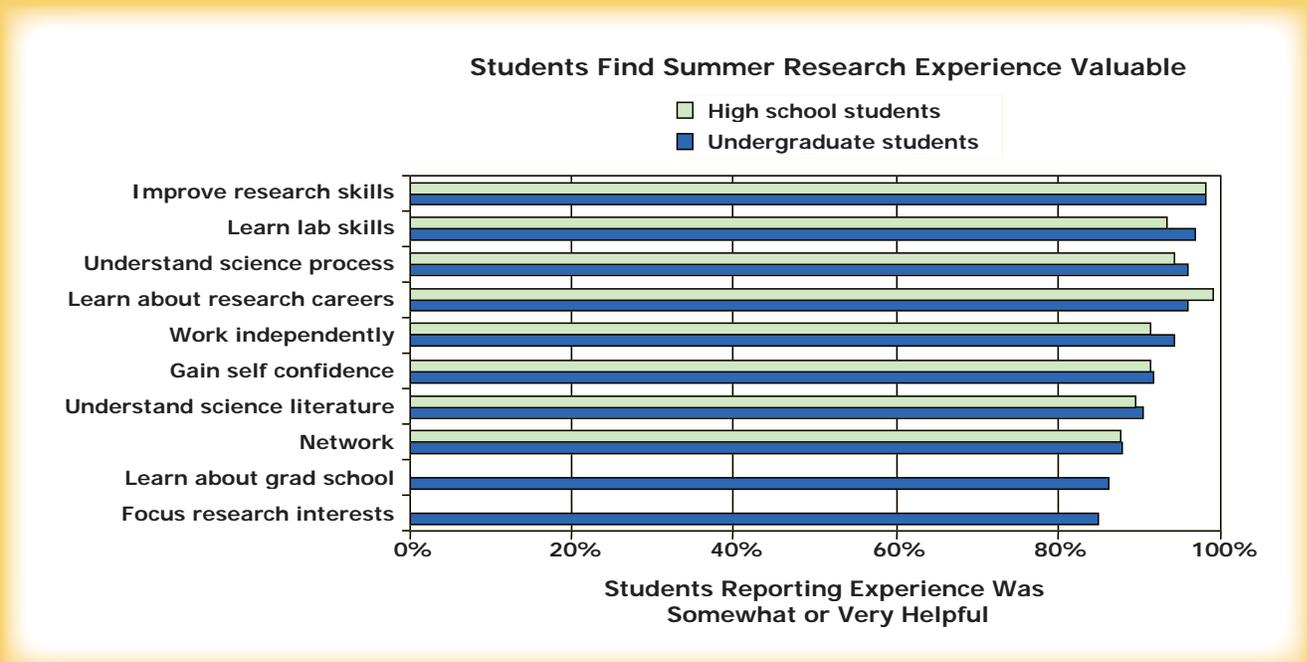
¹ Administrative Supplements Providing Summer Research Experiences for Students and Science Educators. http://grants.nih.gov/recovery/summer_opps.html. Accessed December 23, 2009.



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Exceeding Expectations

Students participating in the program were enthusiastic about the experiences they had in the lab, which, for many (71%), exceeded their expectations. Nearly all (93%) felt that their mentors made them a part of the research team, and undergraduates found that the experience helped them to focus their research interests (85%) and develop an understanding of what graduate school would be like (86%). Both college and high school students reported that it helped them to learn what a career in research is about (97%), strengthen their research (98%) and laboratory skills (96%), and understand the scientific literature (90%) and the process by which scientific knowledge is constructed (96%). The experience also helped students to network (88%) and boosted their self-confidence (92%) and ability to work independently (94%).



In addition to contributing to a particular project, many students participated in a number of other educational activities important to the training of a scientist. For example, they had opportunities to develop research proposals at the start of their projects (25%), deliver presentations to their research group (65%) and at scientific conferences (20%), attend scientific seminars (51%), and prepare research reports or abstracts for publication (35%). Thirty-five percent received instruction in scientific ethics, and roughly half of undergraduates received advice about scientific careers (53%)

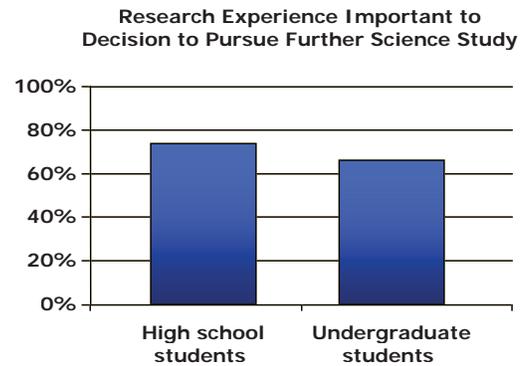
“My summer research experience far exceeded my expectations. I gained skills as an independent researcher and was eager to get involved in advanced cancer studies. The researchers in the lab were very accommodating and went out of their way to make my experience a great one.” --Undergraduate student participant



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or attending graduate school in science (48%). In addition to helping prepare these students for jobs in science, these activities gave them the opportunity to develop skills, such as writing and public speaking, which are valuable in a wide range of careers.

NIH's summer research program successfully encouraged students to pursue advanced study in the sciences. Nearly three-quarters (74%) of high school student respondents planning to major in science reported that their summer research experience played an important role in that decision. Likewise, 66% of undergraduates planning to pursue a master's or doctoral degree in science indicated that their research experience was an important factor in that decision. For the majority of students, their continued interest in science included an enthusiasm for research: 88% of high school and 85% of continuing college students reported that they were likely to participate in another research opportunity if they could.



Enhancing Science Education

Teachers and college faculty at non-research intensive institutions were also able to participate in the summer research programs. Nearly two-thirds of the 56 teachers who responded to the survey taught at the middle or high school level (63%). Almost half (46%) taught multiple subjects, with the most common being biological science (61%), chemistry (48%), physics (20%), and earth and environmental science (18%). There was a nearly even split between those who had some previous experience conducting research (52%) and those who had none.

Teachers: How do you expect this research experience will benefit your work as a science educator?	
Enable me to develop new or revised content to lessons and/or labs	82%
Enable me to discuss science careers and related jobs with more confidence with students	73%
Expand my network of scientists and science educators	77%
Enable me to identify and take advantage of other science education opportunities	64%
Enable me to introduce new technologies into classroom/lab exercises	66%
Enable me to develop hands-on classroom activities and/or new laboratory exercises	64%
Enable me to raise educational standards in my classes	55%
Prepare me for new leadership roles/responsibilities in the school district	30%



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In addition to making a contribution to biomedical research, the teachers, like the students, participated in a range of professional development activities. Most of them had opportunities to interact with other scientists and educators (89%), participate in lab meetings (73%), develop research reports or abstracts for publication (61%), attend scientific seminars (61%), and deliver presentations to their lab group or other summer research participants (61%). Many were able to make a presentation at a scientific conference (32%) and develop an application or proposal at the start of their projects (27%).

The NIH summer research program gave teachers valuable learning opportunities that they could integrate into their teaching. A large majority (88%) indicated that they were likely to apply what they learned to their work as science educators. Teachers expected to be able to create new or revised educational content (82%), introduce new technologies into their labs and classrooms (66%), develop hands-on learning activities (64%), and raise educational standards (55%). The experience also gave them more confidence to discuss science careers and related jobs with their students (73%). This boost in confidence applied even to some educators with doctoral degrees and previous research experience. Educators also expected that participation in the program would benefit them professionally, by expanding their network of scientists and educators (77%), helping them to identify additional scientific and educational opportunities (64%), and preparing them for new leadership responsibilities in their school districts (30%). The vast majority of teachers who responded to the survey (95%) reported that they were likely to pursue another research opportunity if given the chance, and 63% indicated that the experience made them more likely to pursue additional education in science.

Fulfilling the Aims of ARRA

NIH used ARRA funds to support scientific research, education, and infrastructure projects that would create and preserve jobs, stimulate the economy, and fuel the engine of biomedical research discovery. By investing in administrative supplements for summer research opportunities, NIH provided valuable employment opportunities to thousands of students and teachers across the country, cultivated interest in science education and careers, enhanced the professional development of science educators, and contributed to the advancement of top-tier research vital to improving the health and well-being of Americans.

To be able to work on a project with a team for an entire summer was fantastic, completely different from my classroom experience during the school year.” --Undergraduate student participant

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FASEB is composed of 23 societies with more than 90,000 members, making it the largest coalition of biomedical research associations in the United States. FASEB enhances the ability of biomedical and life scientists to improve—through their research—the health, well-being and productivity of all people. Our mission is to advance health and welfare by promoting progress and education in biological and biomedical sciences through service to our member societies and collaborative advocacy.