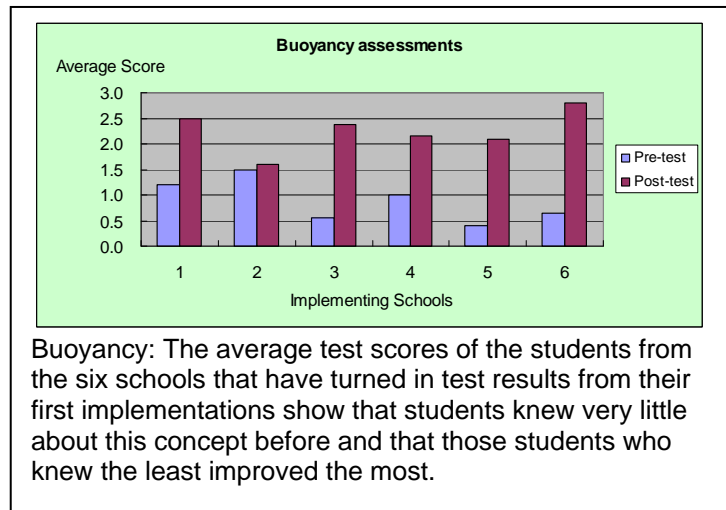


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Mr. Chairman Mollohan and Ranking Member Frelinghuysen, it is my honor to speak to you today about the difference that funding from agencies under your jurisdiction, notably the National Science Foundation (NSF), is having on teachers and students throughout New Jersey. My name is Beth McGrath and I am the Director of the Center for Innovation in Engineering and Science Education (CIESE) at Stevens Institute of Technology. Last fall, I had the opportunity to meet the Director of the NSF, Dr. Arden L. Bement, Jr., at a forum sponsored by Congressman Frelinghuysen in New Jersey, and I was encouraged to share the success of our university-based initiatives working with teachers and students in K-12 schools.

The Center for Innovation in Engineering and Science Education (CIESE) at Stevens Institute of Technology is currently implementing a \$1.2 million NSF Information Technology Experiences for Students and Teachers (ITEST) program whose objective is to motivate students—particularly those from underrepresented groups—to pursue study and careers in engineering, science, and information technology. Over three years, this grant will have impacted more than 2,600 middle and high school students largely from urban, disadvantaged school districts such as Newark, Jersey City, and Camden, New Jersey. In this project, students work in teams to design, build, and deploy remotely-operated vehicles—robots constructed from LEGO materials, motors, and controlled by wire-guided switches—to perform a series of increasingly complex challenges in an underwater environment. Students learn and test their understanding of sometimes abstract and difficult concepts such as buoyancy, gears, and electricity.



During this first year of classroom implementation, the project is showing an impressive impact on student learning of these concepts, as well teachers' assessment of their students' problem-solving abilities, engagement, motivation, and ability to work in teams. In addition, a critical objective of this grant is to bolster the understanding of guidance counselors about the need for and diverse career paths available to students who pursue Science, Technology, Engineering and Mathematics (STEM) and IT study and careers, and to break down stereotypes about the gender and ethnic backgrounds of those suited to pursue engineering and technical professions, so that more students will be encouraged to pursue these fields.

Teacher Aaryenne White of Veteran’s Middle School in Camden, New Jersey, a district in which 91% of students participate in the federal lunch program, wrote about the project:

“I cannot fully express how the BUILD-IT Program has changed our students. Contrary to the media's repeated image of the lackadaisical inner city student, I am often overwhelmed with students who attempt to show their talent and ability. I am even approached by students in lower grades who ask me what they should do to be in the class next year. My students are excited with dreams and possibilities fueled by their new levels of confidence and focus. I have been able to introduce my students to a new world of goals and careers they never thought about or knew existed. I thank you and your program for helping me help my students look toward new challenges.”

At the other end of the socio-economic spectrum, two other BUILD IT participants from an affluent New Jersey suburb have also expressed the impact of the program on them and their school:

Robbinsville High School Student Ridi Alvi states, "Since I was always interested in technology, BUILD IT helped me foster those interests and make them academic and career goals. [This program] gave me the opportunity to explore and learn the "tricks of the trade" of an engineer, and what it truly means to become one.”

Robbinsville teacher Joy Wolfe says: “As a result of our BUILD IT experience, we won a \$6,000 NASA Rookie grant and started a FIRST robotics team that ultimately placed second in the NJ FIRST Robotics competition and earned the right to compete in the 2008 national competition in Atlanta. The team has been honored by their peers, administration, the town council, members of the business community, local papers, and the local radio station. They have raised the positive awareness of STEM activities, experienced and helped portray engineering as fun and exciting, and added a "cool" factor to the discipline. Our students are athletes, artists, theater people, writers, student government, and come from all areas of interest.

“The majority of BUILD IT seniors applied to colleges as engineering majors and have a firm foundation of what to expect as they start their college careers. They believe that engineers make the world a better place...”

Another K-12 initiative also greatly benefits from an NSF investment in innovative, research-based curriculum resources. The Stevens *Engineering Our Future NJ* program aims to ensure that all students in New Jersey experience engineering—with a focus on innovation—as an integral component of their K-12 education, not merely as an elective or extracurricular activity. We adamantly believe that this objective, to include engineering in classes taken by **each and every student**, not only those who know enough about engineering to self-select a course or participate in an after-school competition, is a critical element necessary to harness the talent of **all** students—girls, African Americans, Hispanics, and other groups not adequately represented in our present technical workforce. To date, this multi-faceted program has impacted 1,451 teachers to date in 250 school districts in all of New Jersey’s 21 counties. NSF’s investment in the *Engineering is Elementary* curriculum, a product of the Boston Museum of Science, has

allowed us to attract approximately 600 elementary teachers to workshops and programs in order to present the relevance of engineering and its connection to elementary science topics.

Two other NSF programs at Stevens, one aimed at preparing engineering doctoral students with strong communication and teaching skills, and another focused on an important area of biomaterials research, are also having a broader impact on the K-12 community.

In a recently-funded GK-12, or Graduate Teaching Fellows in K-12 Education, award, 50 Ph.D. students will impact 130 high school teachers and nearly 12,000 students over a five-year period with classroom support for STEM content and lessons that showcase innovative engineering research.

And lastly, the research associated with an NSF Nanotechnology Interdisciplinary Research Team award, which is developing hydrogel materials to reduce infection during joint replacement surgeries, will be adapted to develop lessons suitable for high school biology and chemistry courses. By integrating cutting edge applications of science and engineering into high school science course work, we expect to entice more students into STEM disciplines.

In closing, as your Subcommittee makes critical decisions about where best to allocate limited federal resources, I wanted to share with you some highlights of the many NSF-funded educational and research programs that are making a real difference in the lives, and the very futures, of all our children. Thank you again for this opportunity.