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STEM in Action: Transferring Knowledge from the Workplace to the Classroom

Testimony of

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Introduction

Hello, I'm Jennifer Jones. I am a Principal Clinical Scientist at Abbott Vascular in Santa Clara, California. I have a PhD in Kinesiology with an emphasis in exercise physiology, hypertension and genetics. Abbott is a global, broad-based health care company, headquartered north of Chicago, Illinois, devoted to the discovery, development, manufacture and marketing of pharmaceuticals and medical products, including nutritionals, devices and diagnostics. The company employs nearly 90,000 people and markets its products in more than 130 countries. At Abbott Vascular I am the lead clinical scientist for the phase III Investigational Device Exemption (IDE) trial to support the United States approval of a new coronary artery device technology. However, I have also been privileged to provide leadership in one of our major volunteer efforts, Abbott Family Science.

I am here today because I have a passion for science and science education and the impact we as science professionals can have on our community. I have experienced firsthand what it feels like to work with children and their parents who may have never met a "real" scientist. I have seen the excitement in their faces when they learn that a scientist may be someone who looks like them. And I see the profound impact that mentoring experiences have on my colleagues, as they gain valuable skills in learning how to translate both their knowledge and interest in science to people in their community.

I have experienced continued scientific and personal growth throughout my development and career with the help of mentors that have exposed me to scientific areas that were initially not in my vantage point. Through these relationships I realized how limitless our

potential for intellectual and personal growth can be. I believe that many of us have an obligation to serve as mentors to the generations to come, and am pleased to be part of a professional program that provides a solid framework for effective mentoring opportunities.

The science education programs of Abbott and the Abbott Fund, Abbott's philanthropic foundation, are an example of the kind of public-private partnership that can serve as a catalyst, inspiring an interest in science in young people, enriching the professional lives of scientists, and inspiring teachers. By engaging in both rigorous research and thorough preparation, we can develop programs that have a long lasting impact on the communities and people involved. By developing strong community collaborations, we can ensure that the programs we offer serve students who are most in need of programs that complement their school offerings.

Private-public partnerships are critical for leveraging existing effective delivery models, and for providing expertise and innovative science content based on authentic science experiences, interaction with working scientists and exposure to STEM careers. Through this we are not only giving our children the best possible opportunities, but ensuring that they will have the tools, creativity, and inspiration they need to continue to transform their own communities and the world.

Overview of Need

As a working scientist, I see on a daily basis the need for innovation in solving some of the greatest problems we face, as a nation, and as a global community. To address those problems, we need to cultivate and nurture the next generation of scientists, yet we are lagging behind other developed countries in these efforts. Perhaps nowhere is that need more apparent than in the U.S. rankings in the Program for International Student Assessment (PISA) measurement. In the 2006 and 2009 ranking, the U.S. was ranked as average, below top performers like Canada, China, Finland and Japan. We are average, yet "average" will not work in solving 21st century problems.

U.S. Secretary of Education Arne Duncan stated after the release of the PISA rankings, "Being average in reading and science—and below average in math—is not nearly good enough in a knowledge economy where scientific and technological literacy is so central to sustaining innovation and international competitiveness."

Even more sobering is the large gap in U.S. rankings between low socio economic status students and their high socio economic status classmates. While our white and Asian students perform about as well in science and math as the average student in high-performing countries like Canada and Japan, our Latino and African-American students perform at lower levels.

We need a fully engaged, and scientifically literate society. We need these students, not only to be better than average in math and science, but to be better, more knowledgeable and more innovative than those of us working in the sciences today.

Science Professionals as Mentors

A 2006 Global Science Forum of the Organization for Economic Co-Operation and Development (OECD) advocated that providing positive exposure to science at an early age is critical to inspiring future interest. A recent 2011 study published in the Journal of Science Education found that the most promising route to generating more college graduates with STEM degrees is not enrolling them in more advanced science and math courses, but simply doing more to spark their interest at an earlier age.

Beyond the statistical evidence, I have seen firsthand the impact of bringing scientists together to work directly with families in underserved communities. One of the schools we work with, Brookfield Elementary School in Oakland, California, is an example of a school that struggles with providing basic resources, much less serving as an inspiration for its students. The day prior to our very first program at this school a few years ago, the school had been robbed and gutted of all electronic and computer equipment. Yet we held the event bringing together working scientists and families, and for that school, began a process of transformation with more engaged parents, more engaged teachers, and kids who started to envision science careers as a possibility. For Brookfield Elementary, the principal Adam Taylor has seen an increase in participation of parents in their children's education, an increase in the willingness and comfort of the teachers in engaging in hands-on experiments with their students, and an increase in the school's overall science scores.

We know that these types of transformational moments do not happen by accident. For the event to be effective, we recognize that we need to invest in professional development and training that can prepare our scientists to effectively serve as mentors in these and other programs.

As a company that values science, Abbott recognizes that one way to provide this positive exposure to science and science professionals is to get working scientists and students together. The Abbott Fund established the science education programs to work with students in a variety of settings, from classrooms and actual working labs, to science museums and festivals. Abbott scientists lend their expertise to these programs to help cultivate an interest in science learning.

These programs look to spark an interest in science among young people to inspire the next generation of scientists, and to foster a better understanding of science and a richer appreciation of the value it brings to improving human health. Engaging and inspiring

students, families, and schoolteachers in scientific exploration, these programs deliver vital educational science opportunities in informal settings. We create a culture for students in which their interest in science is encouraged, including through real-world experiences beyond the classroom.

The Abbott and Abbott Fund Science Education Programs span the K-12 STEM learning spectrum, starting early to spark that interest. The Abbott Family Science program starts in elementary school and encourages parent-child interaction around science with Abbott scientists and volunteers serving as facilitators. Research has shown that at this age, it is crucial to encourage parental involvement and engagement.

For middle school students, we offer the Abbott Operation Discovery program, which brings students together with scientists in a working lab environment to engage in hands-on science experiments that complement school curriculum. Also receiving support is Project Exploration, a non-profit organization serving minority and female students at a time when they are most vulnerable to losing an interest in science, technology, engineering and math.

High school students are served by programs such as After School Matters – a Chicago-based after school internship program, and FIRST Robotics – a global afterschool science and engineering program. Abbott scientists serve as frequent mentors and advisors in both programs.

Our support includes a presence in science and children’s museums, where a broad range of public audiences can be reached. One example is the recent development of a new traveling science exhibit in partnership with the Kohl Children’s Museum in Illinois. The Science + You exhibit is specifically designed for children ages 8 and under, giving them a positive early exposure to science labs and scientists. There are very few exhibitions of this nature for this age group. Thus the exhibition is in high demand and will be traveling to DC, San Francisco and other US and international locations. Abbott scientists were actively involved in the development of the exhibits, and serve as volunteer demonstrators, reaching visitors directly. In each locale, Abbott scientists will present live demonstrations and science activities.

Collectively these programs have reached millions of students, parents and teachers worldwide. While we are pleased with the numbers of individuals we are reaching, we know as a science company that thorough and rigorous evaluation of effectiveness and impact is key to the programs’ continued success.

Creating an Effective Program Framework

The Abbott Fund has invested in a program structure based on best practices and a solid understanding of the impact on the program participants. This methodology applies to both

the training and professional development we provide to participating scientists, as well as to evaluation and assessment of the impacts of the programs on students, parents and teachers.

We have learned a great deal since we began to offer these programs more formally in 2005. Traditional programs that place a scientist in a classroom or museum setting are not necessarily beneficial to the student or the scientist. Often the scientist needs guidance, not only in how to convey content, but also in how to communicate passion and enthusiasm. Training and professional development has been provided for scientists on how to do just that.

In order to apply best practices in training and professional development, the Abbott Fund has participated in national projects and conference sessions focused on preparing scientists for working with the public in informal settings such as after school programs and science museums. Best practices identified in these settings are continually being applied to Abbott Fund training models for scientists. These models are designed to prepare the scientists to work as facilitators and guides for families and students. We particularly train the scientist to encourage active student and family engagement in science discovery, rather than simply providing demonstrations or lectures.

The training increases the capacity of Abbott scientists to serve as trainers for future volunteers and to serve as internal and external ambassadors for the programs. In addition, the skills developed and enhanced are beneficial not only to scientists' volunteer efforts, but also to their ability to communicate and work together effectively in the workplace. For us, we believe our scientists learn valuable lessons working with, and within, their community.

Of course, a solid understanding of the impact and effectiveness of programs is key to making a difference. Not only are the programs evaluated for their effectiveness, we modify programs based on the particular needs of the community, whether it is the need for translators at an event, or helping to provide transportation for families who may need it. We are currently adapting the Abbott Family Science model to work in a very large festival setting. I am bringing a group of scientists to participate in the first ever free Bay Area Science Festival and we expect to interact with thousands of visitors.

For the Abbott Family Science and Operation Discovery programs, an analysis of findings from programs found significant change in the participants' interest in science following participation in the programs. In the case of Abbott Family Science, only 39% of participants reported they were likely to engage in science exploration as a family prior to attending an event, compared to 84% of the participants after the event.

I hear from my colleagues that giving back to the community is more than a "feel good" opportunity. I recently heard a soon to retire Abbott colleague's perspective on being a

mentor. Now that he is at the end of his career, he looks back at the people he has mentored over the years. What he said struck me, "These people now are better than me, and that is the way it should be." That is what we should be striving to do, enabling our students, our children, to be better than us. To accomplish more than we ever could imagine.

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