TESTIMONY OF
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U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON
SCIENCE, SPACE AND TECHNOLOGY
SUBCOMMITTEE ON RESEARCH AND SCIENCE EDUCATION

STEM IN ACTION: TRANSFERRING KNOWLEDGE FROM THE WORKPLACE TO THE CLASSROOM

NOVEMBER 3, 2011

Good morning. I am Robin Willner, Vice President of Global Community Initiatives. I am responsible for IBM's community relations program worldwide, including our work in education. Over the last two decades, IBM has been one of the leading corporate contributors of cash, technology and IT services to non-profit organizations and educational institutions across the U.S. and around the world. We have learned that our most effective grants and partnerships are those that focus on IBM's unique offerings – leveraging our software, hardware and technical services and most importantly, the talent of IBMers. We are most successful when we design initiatives to bring the skills and experience of our employees into the classroom, interacting directly with students, teachers and administrators, to provide what we call a "smarter education."

Thank you for giving me the opportunity to share with you IBM's Transition to Teaching initiative as well as other innovative strategies that we have developed. These all aim to increase the

pipeline of young people prepared to be the STEM professionals and the leaders of a growing economy.

I don't need to review the growing body of research that highlights the disconnect between the labor market needs and the employment opportunities of the 21st century against the inadequate number of students graduating from high school prepared and ready to pursue STEM careers. This hearing is one step in this Committee's recognition and examination of these issues and potential solutions.

We all know that the US is falling well behind other countries in the number and proportion of high school graduates who intend to pursue STEM careers. The relatively small number of students who eventually complete their post-secondary education in STEM fields further increases our economic disadvantage. Moving from the macro-economic to the personal, a new report from the Georgetown Center on Education and the Workforce shows that 65 percent of individuals with Bachelor's degrees in STEM occupations earn more than their peers with Master's degrees in non-STEM occupations. Further, 47 percent of those with Bachelor's degrees in STEM occupations earn more than even individuals with Ph.D.s in non-STEM occupations. Additionally, even people with only STEM certificates can earn more than people with non-STEM degrees.

Clearly, continued economic growth will require a base of scientists and engineers and the next generation of innovators. It is clear that if we are going to have a constant flow of talent in science and engineering, we need to attend to the earliest stages in the K-12 pipeline. We must insure that students in middle and high school are having the experiences that will generate enthusiasm about science and math and their ability to solve problems. They must also complete a rigorous curriculum with

high academic standards so that they have the option of pursuing scientific and technical degrees in college.

Beyond basic math and science, they will also need a range of workplace competencies. These include the social skills to work in diverse, multi-disciplinary teams; adaptability and leadership; communication skills to work with customers and clients and co-workers; and the ability to be comfortable with ambiguity, to recognize new patterns within disparate data, and to be inquisitive and analytical.

This is a very tall order and while there are many components to effective school improvement, a critical and necessary factor is developing a cadre of excellent math and science teachers in our schools, teachers who have the content expertise, the real world experience, an understanding of problem-based learning and the pedagogic practice to launch the next generation of innovators.

In September, 2005, IBM announced **Transition to Teaching**, our own initiative to address the K12 pipeline issues and encourage young people to enter science and engineering careers. This is just one program in our portfolio of education programs including those aimed at early childhood education, TryScience and Teachers TryScience, MentorPlace and P-TECH. Transition to Teaching emerged from a decade of programs and learning of what works best.

For Transition to Teaching, we decided to address the issue by leveraging our greatest asset – IBM employees. Of course, most IBMers have backgrounds in math and science, whether they are currently working in software development, research, consulting or management. IBMers are also great volunteers. This year is IBM's Centennial and a major component of our anniversary was Celebration of Service, where IBMers around the world answered our Chairman and CEO's call to do at least 8 hours of service in

their community. More than 300,000 IBMers worldwide volunteered through our On Demand Community, contributing more than 10 million hours of service. This will not end with our Centennial celebration – the volunteering will continue.

The place that IBMers are most likely to volunteer is in a school, whether to teach hands-on science classes for eWeek, serve as one of our 6,000 eMentors providing online academic assistance to students, work with children in a Head Start or daycare program, lead an after school program for middle school students, present at Career Days on STEM opportunities, provide professional development to teachers or coach high school students for a science fair through TryScience.org. They also run EX.I.T.E. camps for middle school girls to encourage them to pursue math and science careers. These IBMers tell us repeatedly that they have a passion for education, for young people and for giving back to the community.

At the same time that we are focusing on the national decline in math, science and engineering, another trend has the public's attention – the changing face of the labor force. Recognizing that there is a large group of IBM employees who are approaching what was once formal retirement age, and that IBM employees are eager to continue working and contributing to their communities, we are specifically targeting our mature workers who are interested in a second career in teaching.

Many IBM employees are already thinking about teaching as a second career and are seeking good information and programs. Others have the exact background and skills and we want to introduce the idea of teaching into their plans. We want to reach all of them and encourage these IBM employees who are ready for their next challenge to help address the national teacher shortage in math and science.

More than 120 IBMers have participated in the Transition to Teaching program to date. Each employee chosen for the program is a math or science professional with at least one degree in a STEM field – though most of them have several. The most common degree that we see is in some area of engineering, but participants come from all parts of IBM's business with experience in every area of math, science, engineering and computer science. They have experience working with children, volunteering in one of the many IBM programs and often adding additional volunteer time at after school, weekend and summer programs in their communities. They participate in a range of teacher certification programs, depending on their experience, prior course work and the specific licensing requirements and available graduate programs in their respective states

IBM provides each participant with up to $15,000 for tuition reimbursement and to cover related costs. The IBMers can choose to use some of these funds as a stipend for a special leave of absence that enables them to gain direct experience in the classroom and complete student teaching, all while maintaining their benefits at IBM.

Transition to Teaching is based on a number of proven programmatic essentials. Teachers must have a strong, in-depth background in the subject area. Our criteria focus on IBMers who already have a Bachelors degree or higher in a math or science discipline. We also believe that IBMers need to learn the craft and skill of teaching, classroom management, and instructional practice to be effective. So we are reimbursing their tuition costs for education preparation. And finally, we believe that it is absolutely essential for an individual to have real life K12 classroom experience, to observe good teaching and then practice good teaching before taking responsibility for a class of children. Therefore, we are also providing stipends for IBMers

so they can go on a leave of absence, maintain their benefits and do student or practice teaching for up to 1 year.

I want to highlight three challenges that we need to address going forward in order to attract math and science professionals into the schools and prepare them to become exemplary teachers:

1) We need to develop standards for the pedagogic and instructional skills and knowledge required and focus on just the limited number of effective education courses necessary for teacher certification,

2) We need to assure that candidates are placed in supportive environments for practice teaching positions under qualified teachers, and

3) We need to provide mentoring and peer support during the first two years of a new teacher's career to assure that they are able to provide the highest quality of education for their students.

The vast majority of degree programs in education still do not meet these criteria. First, too many programs include coursework that is not relevant or helpful to new teachers. There is not enough practical, hands-on experience. We don't prepare world champion sports teams by discussing the physics of the jump shot or the history of the Olympics. We give them time to practice and that's what our teachers need. IBMers are also eager to start teaching. Just as we now have standards for what every student in grades K-12 must know and be able to do in each subject, we need to have consensus standards on what a candidate for teaching needs to know and be able to do. We need to focus on the essential skills while recognizing the distinct experience of adults approaching a second career. We still need to develop

streamlined programs that provide second career teachers with a program that can be completed in a limited period of time, that include everything they need to know, but nothing more.

Second, we need to make sure that practice teaching is done under qualified, experienced teachers. This means collaborating with schools and school districts to place teacher candidates in appropriate settings and also providing support to mentor teachers. We need to assure that the valuable time of these candidates is spent on worthwhile experiences. And third, beyond student teaching, once teachers enter their new careers, they need ongoing mentoring from expert teachers and peer support to succeed. Social media and new communication tools make this much easier and cost-effective to provide without interfering with the school day.

IBM's Transition to Teaching is one small effort. At this time, we have 31 IBMers who have completed the program and have left IBM as fully certified teachers who are now teaching math and science around the nation. However, we know that our 120 or even 150 participants will not make an appreciable difference in a teacher shortage of national proportions, though we are convinced that they will have a significant positive impact on the thousands of students they teach. If another 25 large companies established similar programs, we could bring a substantial number of math and science teachers into the ranks. We can also change the community conversation and raise the reputation of teaching as a desirable career. However, the private sector alone can not solve this problem. It will take improvements in teacher training programs and professional development at every school district. And school districts must change the way the recruit, hire, place and supervise teachers to retain the best professionals.

But the success of Transition to Teaching is evident when we speak to the new teachers and their principals.

Gary, now teaching math in New York: "This is my dream! To become an 8th grade math teacher."

Jim, now teaching math in Texas: "People wonder what IBM has to gain. My impression is that it is the right thing to do to help the country."

And from one of the Principals in White Plains NY, now supervising a Transition to Teaching graduate: "Jennifer has had an outstanding beginning as a teacher. Her experience as a mother and a former manager has enabled Jen to nurture and advance middle schools students at this critical cross road. She is exuberant and enthusiastic about math and makes it come alive for her students. Jen is an integral part of this building. Undoubtedly, her professionalism comes from her IBM background and her enthusiasm is contagious. I am very grateful that IBM's Transition to Teaching Program helped to add Jen to our team."

Transition to Teaching works on several fronts. The participants achieve their career aspirations and are able to make a significant contribution. IBM's support makes the transition smooth and viable in terms of preparation, financing and benefits. IBM also gains substantially, both in terms of personnel recruitment and retention in the near term, by reinforcing our status as a great corporate citizen and an excellent employer. Moreover, this is an investment in the long term, insuring the pipeline of new STEM professionals who will one day work at IBM or one of our clients.

I would be remiss if I didn't take this opportunity to share with you one other new IBM initiative in education. As I explained, our employees have many opportunities to volunteer in schools. This fall, we combined this great volunteer pool with a new partnership to design secondary schools that will prepare students

to enter a good paying career in Information Technology. Working with the NYC Department of Education, the City of New York and New York City Technical College, we have launched P-TECH or Pathways in Technology Early College High School. This unique 9-14 program provides students with academic preparation in science, technology, engineering, and mathematics. P-Tech graduates will earn a no-cost Associate in Applied Science (AAS) degree in Computer systems Technology or Electromechanical Engineering Technology. P-Tech graduates will be prepared to enter the growing high-technology workforce immediately upon completing their academic program. Graduates also will receive the strong academic grounding necessary for them to pursue four-year Bachelor's degrees and beyond. P-Tech is located in the Crown Heights section of Brooklyn, New York and serves a very diverse population.

P-TECH is an early college high school; a model that provides students the opportunity take college level courses as early as 10th grade, earn college credits and complete an integrated high school/associates degree curriculum that seamlessly leads them into the adult world. But P-TECH goes one step further. Not only will students be able to take college level courses and earn credit – they will be able to complete a free associates degree. And with the participation of IBM, we have been able to map the job skills required for every entry level job at IBM that requires an associates degree and review, revise, and enhance the curriculum to assure that the students will meet those requirements. They will also have work place experiences and work based learning to complete their learning and preparation for success in the work force. To make sure that students, regardless of their background or experience, can meet this very high bar, every one of them will have an IBM mentor. Last month, we had more than 100 IBMers at P-TECH to meet the 9th grade students they will mentor this year and over the next several years. I had the privilege of participating – hearing and

seeing the excitement, the inspiration and the learning that these pairs of students and mentors have already begun.

Our goal is not to have one unique school for several hundred students, but to develop a core program that can be readily replicated and localized and brought to scale. We are already working with the Mayor and Schools Superintendent in Chicago to replicate P-TECH and to bring the model to other key industries as we scale the program. There's no reason why this approach can not be used in school districts across the nation to upgrade the STEM curriculum, provide new rigor to both the high school and community college programs and assure students that they will indeed be career and college ready upon graduation.

P-TECH, along with all of our initiatives, requires intensive partnership. We must work closely with our colleagues in public education to assure that we have deep and widespread reforms. Business partners, like IBM, bring a unique perspective on labor market needs, the skills gap and the workplace environment. These issues must be integrated into all curriculum and professional development reforms if we expect to deliver on our promise to students that they will be prepared for good-paying careers and that many of them will be the leaders to grow the economy going forward. Thank you.