

**TESTIMONY OF
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Members of the Commission, I am Sheila Appel, Manager of Corporate Citizenship and Corporate Affairs at the IBM Corporation. Thank you for inviting me to testify about business and industry's stake in education reform, college readiness and workforce development. My plan is to share what IBM is contributing to the educational reform agenda, and to underscore the importance of strengthening STEM (science, technology, engineering and math) education for all students.

However, you may be asking what is my personal investment, I had the pleasure to serve as a member of Chancellor Zimpher's team that traveled around our state participating in regional conversations with key stakeholders – which resulted in her strategic plan entitled “The Power of SUNY”; appointed by the New York State Regents and State Education Commissioner to serve as a board member on The State Professional Standards and Practices Board for Teaching, I've served on the Board of Directors for Dutchess Community College Foundation; served in a leadership capacity to help with the formation of the Empire State STEM Learning Network and the mid-Hudson regional hub; serve on the board of directors of our local Workforce Investment Board, Chair the Youth Council of the WIB; Board Chair of our local United Way, where education is one of our top priorities, certainly these roles don't make me an expert, but I hope demonstrates my commitment to education. But, some of my fondest and proudest accomplishments are that I have lived in New York my entire life, a graduate of our public schools and colleges, as are my three children, and now two of my grandchildren attend our public schools. So, I'm invested!

In a major survey released by IBM last May of more than 1,500 CEOs from 60 countries and 33 industries worldwide, chief executives believe that -- more than rigor, management discipline, integrity or even vision -- successfully navigating an increasingly complex world will require individuals to have creativity.

Just what does creativity have to do with STEM education? In a word: *Everything*. Science, math and engineering are not simply about facts and figures and pure know-how. At their core, these disciplines exemplify creativity – forging new paths and discovering innovative solutions.

But we also believe that science, technology, engineering and math cannot be reserved solely for future scientists and engineers. We must ensure that all students in elementary, middle, junior high and high school are having the experiences that will generate enthusiasm about these subjects.

When taught well, these disciplines teach young people *how to learn*, preparing them to discover new things every day and approach problems in creative ways, regardless of what professions they pursue. They also equip our young people with the critical thinking and problem solving skills they will require to be the responsible citizens of the 21st century.

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 twenty-first century against the inadequate number of students graduating from high school prepared and ready to pursue STEM careers.

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.

To lead in a world increasingly fraught with economic, social and environmental turmoil, our young people will need these skills and more. They will need to be able to work in multicultural, multilingual, multidisciplinary teams. They will need outstanding and advanced communications skills. Change will be the norm, and they will need to be comfortable with ambiguity. Estimates are that 85% of the jobs today's learners will be doing haven't been invented yet; because no one knows exactly what information and knowledge they will need, we need to prepare young people to be experts in gathering and examining data to come up with innovative solutions to problems that may not even be on our radars yet.

Fostering these skills for all young people is a tall order and requires all hands on deck to achieve. No doubt, it is a challenge that must be addressed through our state and nation's schools. Fundamentally, our young people need incredible math and science teachers, 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.

Clearly schools cannot bear the burden alone. In 2005, IBM launched Transition to Teaching, a program that provides company-paid tuition, leaves of absence and other support, such as mentoring, to skilled employees interested in pursuing a second career teaching math or science. IBM's Transition to Teaching is one small effort. However, we know that our 120 – or even 500 – 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. Just imagine if only 20% of Fortune 500 companies established similar programs, we could bring a substantial number of math and science teachers into the ranks, quickly and economically. 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 in every school district. And school districts must change the way they recruit, hire, place and supervise teachers to retain the best professionals.

IBM believes that our teachers play a critical role in preparing our students for success -- and they too, need the necessary resources and support to adequately inspire their students. So, professional development for teachers is essential. IBM created Teachers TryScience, which is a web site for teachers. This site provides free and engaging lessons along with teaching strategies and resources, which are designed to spark students' interest in science, technology, engineering and math. What more, the site features collaboration tools to enable teachers to discuss and share effective instructional practices.

Volunteers can also make an amazing difference. Through IBM's On Demand Community program, more than 150,000 IBM employees and retirees have contributed an astounding 10 million hours-plus of service since November 2002 to schools and nonprofits. IBM provides our volunteers with training, resources and grants to magnify the impact of their volunteerism, but at its heart, this program is about IBMers who give their time and talents to young people who may never have had the opportunity to meet a scientist or engineer. I've seen our engineers inspire thousands of boys and girls in classrooms around New York State building spaghetti bridges, mummifying apples and setting pickles on fire. For those without a formal corporate program, volunteering can be as easy as signing up to participate in National Lab Day at www.nationallabday.org or National Engineers Week (EWeek) at www.eweek.org .

And, as we talk today about educational reform for the 21st century, I'm proud to share one of IBM's most recent initiatives. In September 2011, the New York City Department of Education, The City University of New York (CUNY), New York City College of Technology ("City Tech") and the IBM Corporation opened Pathways in Technology Early College High School (P-TECH) – an innovative public school spanning grades 9-14. P-TECH's mission is to provide students with a personalized pathway towards mastery of the skills and knowledge that they will need to make the transition from education to industry. P-TECH students will graduate with a no-cost associate degree, and will be positioned to secure entry-level positions in the highly competitive Information Technology field(s) and/or complete their studies in a four-year higher education institution.

Components of the P-TECH Program

P-TECH provides students with a school-college-career continuum that helps them understand the direct links between what they are learning today and the worlds of college and work. The school's rigorous program is designed to inspire students to focus and strive. While P-TECH is a comprehensive school with a number of significant elements, the following provides a brief overview of the core components of the program.

Focus on Early College: Student learning is focused from grade nine on, through a six-year scope and sequence of high school and college coursework to ensure that students will earn an Associate in Applied Science degree in either Computer Science Technology or Electromechanical Engineering Technology, awarded by New York City College of Technology at CUNY, the school's lead college partner. The curriculum is also aligned with the Common Core standards as the foundation for learning in college, particularly higher education institutions with strong math, science and engineering programs. As part of creating the early college culture, students immediately participate in other aspects of the college environment, engaging with college faculty and students.

Focus on Careers: Students participate in an ongoing, sequenced Workplace Learning curriculum informed by current and future industry standards that includes career goals, mentoring, guest speakers, workplace visits and internships. Minimum requirements for entry-level IT jobs, as provided by IBM and other industry partners, have been mapped to the curriculum and are serving as academic benchmarks and targets. A coalition of industry advisors is assuring that the program aligns with industry needs as the IT field evolves. To serve as an added incentive to students, IBM also is making graduates first in line for entry-level jobs – thereby strengthening the continuum from school to college and career.

Focus on Personal Pathways: Each student moves through a personalized academic pathway that is closely monitored by his or her teachers and advisors, based on their individual needs and performance. While the school meets all state mandates for regents and courses, the pace at which the

student moves through the high school and associate degree requirements is personalized, and the requirements sequences are intricately intertwined. While all students are expected to meet high school requirements and earn their associate degree in six years, some may proceed at an accelerated pace to earn their associate degree in a shorter time.

Extended Learning Time: In addition to extending college level coursework into what has conventionally been the high school years, the school day and year also are being extended beyond the traditional schedule to include even more individual support for students.

Specialized Staffing: In order to ensure that the model is adequately supported, both the college and industry partners have provided a full-time position to the school: an Early College Liaison and an Industry Liaison. These positions work directly with the leadership, staff and students. In this way the model is continually monitored to ensure effective practice.

P-TECH was never planned as a single or charter school serving a small number of fortunate students. The broader goal always has been to apply the knowledge and experiences developed in this pilot school to serve as a model for use by other traditional high schools in New York, nationally and globally. P-TECH is designed to be the first in a series of similar institutions, and an exemplar of how K-12 schools, higher education institutions and public/private partnerships can substantially raise graduation rates, prepare greater numbers of students to fill good paying jobs in the IT or other fields, and enable more students to successfully pursue postsecondary education.

Raising the quality of math and science education often seems like a problem without an Achilles heel. But if we band together in new and varied ways, we can make a difference, especially for the young people in our most disadvantaged communities. We can nurture the greatest generation of citizens across an array of fields – science, engineering, medicine, government, business, law – creative leaders at all levels who work together collaboratively, ethically and peaceably across cultures, who understand and address world problems in new and brilliant ways, and who inspire a new generation of thinkers, doers and caretakers of New York State and the world.

IBM is proud of our initiatives. We have done a good deal to address the STEM crisis, from establishing Teachers TryScience that supports teacher instruction in project-based learning to helping start new grades 9-14 STEM schools in New York City to reform career and technical education. But, we are just one piece of the puzzle – we ALL need to do more – and, working together is not only a good thing to do, it is essentially what we must do!

Thank you for the opportunity to speak with you today – and, I also want to thank the Commission for taking the time to engage in thoughtful discussion about how to improve New York’s public education system and to prepare our student’s (my grandchildren) for future success!