

Testimony from the New York University Senior Vice President for University Relations & Public Affairs before the New York City Council Joint Committees on Higher Education and Technology regarding , “How New York City Engineering Schools Prepare their Students for the Future”

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Chairs Rodriguez and Cabrera and members of the Council Committees on Higher Education and Technology, my name is Lynne Brown, Senior Vice President for University Relations and Public Affairs.

On behalf of John Sexton, President of NYU, and Jerry Hultin, President of NYU-Poly, I am pleased to offer this testimony to provide insight into NYU's and NYU-Poly's efforts to strengthen and expand engineering education in New York City.

NYU and NYU-Poly

In 2008, NYU made a major expansion in its portfolio of applied science and engineering when it partnered with Polytechnic University in Brooklyn. The Polytechnic Institute, or NYU-Poly, as it is now known, was founded in 1854 as the Brooklyn Collegiate and Polytechnic Institute. At the time of its 100th anniversary in 1954, Brooklyn Poly was, in terms of enrollment, the largest engineering school in the United States. From 1973 to 1994, the institute focused on renewing its surrounding neighborhood; MetroTech emerged from this effort and provided an urban campus for NYU-Poly in the form of a university-corporate campus.

The affiliation agreement between NYU and Poly restored to NYU an engineering capacity, an absence keenly felt over the years, and created a connection between Poly and a major research university – a partnership that continues to be enormously advantageous to both institutions.

The benefits to NYU-Poly are manifest in the significant gains it has achieved over the past several years. A new recruitment and enrollment strategy has resulted in an enrollment increase together with a rise in the quality of the student body. The average SAT score for the freshman class rose significantly from 1175 in 2006 to 1305 this year. The Poly enrollment now stands at 1,939 undergraduate (up from 1,541 in 2008) and 2,548 graduate students (up from 2,442 in 2008). 40% of Poly students are drawn from NYC and 18% from Brooklyn. I want to share one other Poly student statistic that is truly impressive and a testament to its commitment to diversity and access: the percentage of its undergraduate population receiving federal Pell Grants, reserved for the most needy students, has been 45 percent or higher for each of the past three years.

NYU-Poly has made five exceptional new faculty hires just this year, and its faculty now number 167. It has expanded its research expenditures by 42 percent over the past three years. Its campus and facilities continue to be expanded and enhanced with faculty labs, classrooms, and offices at 2 MetroTech; new administrative offices at 15 MetroTech; the continued renovation of its main academic building; and the soon-to-begin renovations and re-use of many other part of its Brooklyn campus.

Entrepreneurial Engineering

Building upon its guiding orientation of “invention, innovation and entrepreneurship” or i²e, NYU-Poly is working to not only drive engineering education and research forward into ever greater impact, but also to have a greater impact on the local, and global economy.

For example, NYU-Poly’s innovative business incubators are also a thriving part of the New York City economy. NYU-Poly started its first business incubator, the Brooklyn Enterprise on Science and Technology (BEST) in 2004. In 2009, it partnered with the NYC Economic Development Corporation and Trinity Real Estate to open a second incubator at 160 Varick Street. Also at 160 Varick is NYU-Poly’s New York City Accelerator for a Clean and Renewable Economy (NYC ACRE), an incubator program which helps clean technology and renewable energy companies in New York City grow, advancing the City as a role model for environmental sustainability and smart growth. In 2011, it announced its latest business incubator at 20 Jay Street, in partnership with NYCEDC and Two Trees Management, focusing on technology start-up businesses. Together, NYU-Poly’s incubators house 38 companies, have “graduated” 22 companies to larger NYC headquarters, and have created more than 400 new jobs.

Applied Engineering and Urban Science

The momentum created by NYU and NYU-Poly’s vibrant partnership led this spring to a historic development for both the university and New York City. On April 23, 2012, Mayor Bloomberg and NYU President John Sexton announced the launch of the Center for Urban Science and Progress (CUSP), an applied science research institute that is being created by New York University and NYU-Poly with a consortium of world-class universities and the foremost international tech companies to address the needs of cities. CUSP, which will be located in Downtown Brooklyn adjacent to NYU-Poly, will tackle these urban challenges and set the research agenda on the science of cities, educating the next generation of engineers in how to apply that research, bringing innovative ideas to a world market, and creating a new, fast-growing, and indispensable industry—along with the many jobs that go with it.

In creating smart and sustainable cities of the future, CUSP will also generate an economic boon for New York City. It has been estimated that over the next thirty years, CUSP will generate \$5.5 billion in economic activity and \$597 million in tax revenues. Locally, the campus alone will create 2200 construction jobs and 900 permanent jobs with an expected pay-off of over 200 new companies and up to 4600 new permanent jobs.

The research and discoveries of CUSP will position New York City at the vanguard of the emerging sector of urban science and engineering. This will give rise to a brand-new tech cluster in Brooklyn, with dozens of new businesses and jobs that will leverage New York City’s existing competitive advantages of concentration, creativity, and capital.

At full strength, CUSP will accommodate 530 graduate and doctoral students and 50 full-time faculty. These students will emerge as a set of “urban engineers” prepared to identify and solve the needs of cities as the planet becomes increasingly urbanized.

Using cities as a "living laboratories" will be essential to CUSP's research enterprise. We will work with municipal agencies in each of CUSP's partner cities, using their real-world problems to

target our research and apply our solutions in real-world settings. In New York, the Metropolitan Transportation Authority has already agreed to be our prototype partner in this sphere, giving CUSP's researchers access to the specific scientific and engineering challenges the agency faces in the coming years. In so doing, we will create a template for forming similar living laboratory partnerships with other agencies around the globe.

Engineering and Technology in Brooklyn

We have identified Downtown Brooklyn as the preferred location for CUSP. It is a vibrant, creative, entrepreneurial neighborhood whose energy will be leveraged by the tech cluster we expect to spark. Growth in this field will be an especially good fit for MetroTech Center, helping it to more fully realize the City's vision for this campus as a hotbed of technology firms and research.

By housing the new center in Brooklyn, NYU will not only be providing new lifeblood to the derelict MTA building at 370 Jay Street, it will in fact be joining in as an anchor tenant in the revitalization of Downtown Brooklyn and serve as an innovation producer for the burgeoning "Tech Triangle."

Speaker Quinn and the City Council have been strong proponents of the Triangle, which links the Navy Yard, DUMBO and Downtown Brooklyn, and NYU believes that the incremental expansions at Poly, the new incubator space in DUMBO, and now CUSP go a long way to ensuring that the future of engineering in New York City will be headquartered in Brooklyn.

By providing qualified applicants to the ever-growing list of technology start-ups and proven success stories that have moved to the area, NYU-Poly will ensure that when these corporations go looking for young bright minds, they need look no further than the neighborhoods surrounding them.

Bio-Engineering and Information Technology

CUSP and its focus on Urban Sciences represents just one three engineering focuses that now guide NYU-Poly, with the other two being Bio-Engineering and Technology, which we are building out in concert with the NYU Medical and Dental Schools, and Information Technology, which includes such burgeoning fields as cyber security, big data, wireless technology, and gaming, where our Games Innovation Lab has put us at the forefront of this multi-billion dollar, high impact field. NYU-Poly is proud to have some of the leading faculty in each of these areas, and to be bringing the jobs and educational opportunities that they represent to Brooklyn and the city as a whole.

K-12 STEM Programs

In addition to providing a feeder system for the growing technology field in Brooklyn and New York City overall, we provide a road map for youth and minority students in New York. NYU-Poly has for many years conducted a number of in-depth K-12 science, technology, engineering and mathematics (STEM) education programs with public schools, students and teachers. We are committed to help academically prepare K-12 students for advanced STEM studies, higher education and careers through innovative programs; to share the expertise of our faculty and

students and their exciting, interdisciplinary applied and research STEM work; and to contribute substantively to the national movement to greatly improve K-12 STEM education. This commitment was affirmed in March 2011 when the University laid the groundwork to establish a Center for K-12 STEM Education and created a framework for the significant expansion of its work in this area.

For example, a signature initiative, our GK-12 Fellows Program in its 4th year now works with 22 Brooklyn schools, about 40 teachers and nearly 1,800 K-12 students. In this model, graduate students in a variety of STEM disciplines are paired with K-12 teachers to develop and teach grade-appropriate STEM lessons; Fellows work in classrooms 10 hours a week, and mentor an after-school robotics teams. Another key element of this program, teachers attend a weeklong training on NYU-Poly's campus over the summer in robotics and technology.

Other K-12 STEM education efforts at NYU-Poly include Research Experience for Teachers programs, where K-12 teachers come to Poly's campus for 4-week training in science and engineering research that they adapt to their classrooms. Initiatives bring high school students to NYU-Poly's campus for advanced coursework (Introduction to Pre-Calculus, Pre-Calculus, Introduction to Engineering, a custom-designed Life Science module) and research opportunities, provide support to schools in STEM studies through tutoring resources, introducing new technologies, and advisement on the content of STEM-related courses. NYU-Poly is also the New York City partner of US FIRST, a national robotics program, which this year involved nearly 300 teams and thousands of students. The institution will launch this year a 4-week summer program for middle school students on "Smart Cities" science, engineering and technology, and recently initiated a pilot program with a Brooklyn Head Start center to develop STEM-related content for their classrooms.

Of particular note is the deepening collaboration between NYU-Poly and the NYU Steinhardt School of Culture, Education and Human Development. We are excited about the two institutions selection to participate in *100Kin10*, a national initiative to train and retain 100,000 high quality STEM teachers in the next 10 years that is lead by the country's most prominent foundations and education leaders. Under the *100Kin10* banner, NYU-Poly and Steinhardt seek to strengthen both preparation programs for pre-service teachers as well as professional development resources for in-service teachers through increasing access to STEM courses, modules, NYU-Poly researchers, labs and graduate students.

In its K-12 STEM education programs the faculty, NYU-Poly students, and administrators seek to align its work in classrooms with the articulated Common Core or other learning standards for students. NYU-Poly has, for example, adapted robotic tools to teach mathematics and developed an iPad application to teach chemistry. By engaging teachers directly in these programs, the implementation of NYU-Poly K-12 STEM education programs is attentive to the schools' learning objectives for students that participate in its initiatives. The institution is excited about the emergence of Engineering standards over the next year as part of Next Generation Science Standards, and looks forward to making a significant contribution to assist schools as they seek approaches and techniques for meeting those requirements and further integrating science, technology and engineering in their school day.

Next Steps

As you can see, we are doing a tremendous amount, and are constantly seeking ways to do more to train everyone from kindergartners to PhD candidates to be both be engineers where possible, and where not, to understand how the principles and discipline of the STEM fields can enhance their chances for success in whatever they choose to pursue. There are a few ways in which the City Council could help us to do even more, and I will just briefly mention them, and any of which we would be happy to discuss at a future opportunity:

- Continued support for new business incubation, especially as biomedical engineering takes on increasing significance.
- Assistance in siting green power and with creating new types of urban infrastructure.
- Support for increased K12 STEM programs for during the school day and for after hours, including teacher training programs.
- Greater range of affordable housing so faculty and graduate students can live closer to universities and new jobs/ internships
- Transportation enhancements (buses, bicycles, walking access) to enhance the economic engine that is the Tech Triangle in Brooklyn, and to better link Brooklyn to “Medical Mile” on First Avenue.

Conclusion

At NYU we have recognized the centrality of engineering as a field of study, research, and job development. We know the future in Brooklyn and New York City will be productive and lead to new and exciting innovation that will change the way we look at our city, nation, and world.

I want to thank you for raising this important topic at this hearing before your committees. NYU and NYU-Poly look forward to continuing to work with you and your colleagues in City government on this and other education and technology issues affecting New Yorkers.