BRIDGING *the* DIGITAL LITERACY DIVIDE

NEW YORK CITY COMPTROLLER
JOHN C. LIU

Bridging the Digital Literacy Divide

Contents

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The New York City Comptroller, an independently elected official, is the Chief Financial Officer of the City of New York. The mission of the office is to ensure the financial health of New York City by advising the Mayor, the City Council, and the public of the City's financial condition. The Comptroller also makes recommendations on City programs and operations, fiscal policies, and financial transactions. In addition, the Comptroller manages the assets of the five New York City Pension Funds, performs budgetary analysis, keeps the City's accounts, audits City agencies, manages the City's debt issuance, and registers proposed contracts. His office employs a workforce of more than 700 professional staff members. These employees include accountants, attorneys, computer analysts, economists, engineers, budget, financial and investment analysts, claim specialists, and researchers, in addition to clerical and administrative support staff.

About Beyond High School NYC

Beyond High School NYC is a major initiative launched by Comptroller John C. Liu to increase the proportion of New Yorkers with higher education to 60 percent by the year 2025 through strategic investments in public education.

Introduction

"Digital literacy" refers to the ability to use technology, such as computer hardware, software, and the Internet, to locate, evaluate, use, and create information.[1] It demands technical and critical thinking skills to access multiple forms of media and then digest, integrate, and present this information in a simple and accessible manner. Students should be developing these skills from kindergarten through high school to prepare them for college and the workplace. However, research suggests that digital skills among high school graduates across the country are inadequate to meet the demands of institutions of higher education and of the job market.[2] New York City can better prepare its students for post-secondary success by increasing at-home computer ownership, broadband adoption, and awareness of digital literacy training programs and services.

Universal Technology

As technology and our dependence upon it advance at lightning speed, computer skills have shifted from optional to necessary. In 2011, 96 percent of working Americans were using new communications technologies daily, and 62 percent of workers reported that the Internet was fundamental to their jobs.[3] Just to apply for a job requires Internet savvy—more than 80 percent of Fortune 500 Companies *require* online job applications.[4]

Likewise, classroom computer and Internet use continues to increase. An abundance of educational material is available online for students to reinforce or delve more deeply into class lessons. YouTube has an entire site dedicated to education, with sections

1 "Digital Literacy Definition and Resources," University Library, University of Illinois at Urbana-Champaign, http://www.library.illinois.edu/diglit/definition.html, accessed on October 4, 2012.
2 Duke, Lynda M. and Asher, Andrew D., "College Libraries and Student Culture: What We Now Know," ALA Editions, 2012; and "Jobs for New York's Future: Report of The City University of New Yo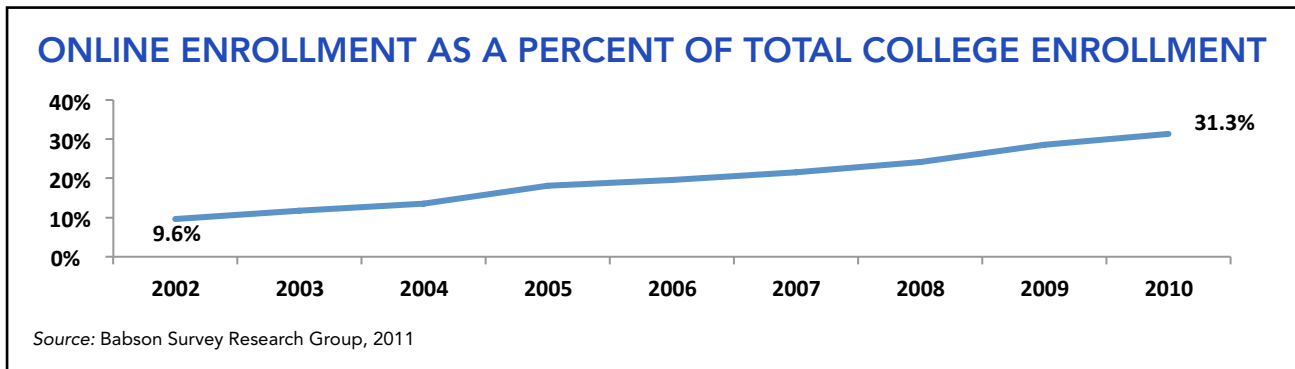rk Jobs Task Force 2012," the City University of New York, http://www.cuny.edu/news/publications/jobtaskforce.pdf, accessed on January 7, 2013.
3 U.S. Department of Commerce, "Fact Sheet: Digital Literacy," May 13, 2011, http://www.commerce.gov/news/fact-sheets/2011/05/13/fact-sheet-digital-literacy, accessed on October 4, 2012. Note that new communications technologies include e-mail and other computer and Internet communications.
4 Usdan, Jordan and Almasy, Kevin, "FCC Chairman Announces Jobs-Focused Digital Literacy Partnership Between Connect2Compete and the 2,800 American Job Centers," Federal Communications Commission, July 23, 2012, http://blog.broadband.gov/, accessed on November 26, 2012.

devoted to primary and secondary education, university, and lifelong learning.[5] For K-12 students, this includes more than 3,000 videos from the nonprofit Kahn Academy, over 5,300 from PBS, and more than 1,200 from Sesame Street, to name a few.

At the college level, between 2002 and 2010 the percent of students taking one or more online courses increased from 9.6 percent to 31.3 percent—a 226 percent jump.[6]

ONLINE ENROLLMENT AS A PERCENT OF TOTAL COLLEGE ENROLLMENT

Source: Babson Survey Research Group, 2011

Even ten years ago, a Pew Research Center report found that 73 percent of surveyed college students reported using the Internet more often than the library for research.[7]

Digital Literacy Skills Deficit

The Common Core State Standards (CCSS), a guide to educational best-practices adopted by New York State in 2010, reflects the necessity of digital literacy skills and integrates them into its standards.[8] Their portrait of a student who is college and career ready includes a section devoted to the strategic use of technology and digital media:

Students employ technology thoughtfully to enhance their reading, writing, speaking, listening, and language use. They tailor their searches online to acquire useful information efficiently, and they integrate what they learn using technology with what they learn offline. They are familiar with the strengths and limitations of various technological tools and mediums and can select and use those best suited to their communication goals.[9]

5 "YouTube EDU," http://www.youtube.com/education, accessed on October 10, 2012.

6 Allen, Elaine and Seaman, Jeff, "Going the Distance: Online Education in the United States, 2011," Babson Survey Research Group, November 2011, http://www.onlinelearningsurvey.com/reports/goingthedistance.pdf, accessed on October 10, 2012. Note that in 2010 6.1 million out of 19.6 million students in post-secondary institutions were taking online courses.

7 Jones, Steve, "The Internet Goes to College: How Students Are Living in the Future with Today's Technology," Pew Internet and American Life Project, September 15, 2002.

8 Common Core State Standards Initiative, "About the Standards," http://www.corestandards.org/about-the-standards, accessed on October 15, 2012. The Common Core State Standards were developed by teachers, school administrators, and experts through the Common Core State Standards Initiative, a state-led effort coordinated by the National Governors Association Center for Best Practices and the Council of Chief State School Officers. They have been adopted in 45 states, Washington, D.C. and three territories.

9 National Governors Association for Best Practices and Council of Chief State School Officers, "Common Core Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects," Common Core State Standards Initiative, 2010, http://www.corestandards.org/

At present, studies show that many college students do not meet these standards, and lack the critical thinking skills required to effectively navigate technology and the Internet. According to research from five Illinois Universities, the majority of college students observed could not conduct, "what a librarian might consider a reasonably well-executed search" and that "students appeared to lack even some of the most basic information literacy skills that we assumed they would have mastered in high school."[10] A Northwestern University study of young adults' ability to evaluate web content found that many did not understand the fundamentals of a Google search.[11] One quarter of students asked to locate information online reported selecting a particular site only because it was the first result to appear, while just 10 percent cited the author and source as the reasoning behind their choice. Even that 10 percent did not attempt to verify the credibility of the sites' authors.

Photo: Kari Otero Photography

Students themselves recognize that their digital literacy skills are lacking. A 2011 study of 3,000 undergraduate students from 1,179 colleges and universities found that many lacked confidence in their ability to use basic software and resources such as spreadsheets (41%), E-books or e-textbooks (39%), presentation software (32%), course or learning management systems (32%), the college/university website (27%), and even word processing (15%).[12] What is more, they reported that they wished they knew how to use several digital media tools better, ranging from more complicated technology tools such as programming language (49%) and audio-creation software (41%), to seemingly more accessible digital media such as freely available course content beyond campus (35%) and web-based citation/bibliography tools (23%).[13]

the-standards, accessed on October 15, 2012.
10 Duke, Lynda M. and Asher, Andrew D., "College Libraries and Student Culture: What We Now Know," ALA Editions, 2012.
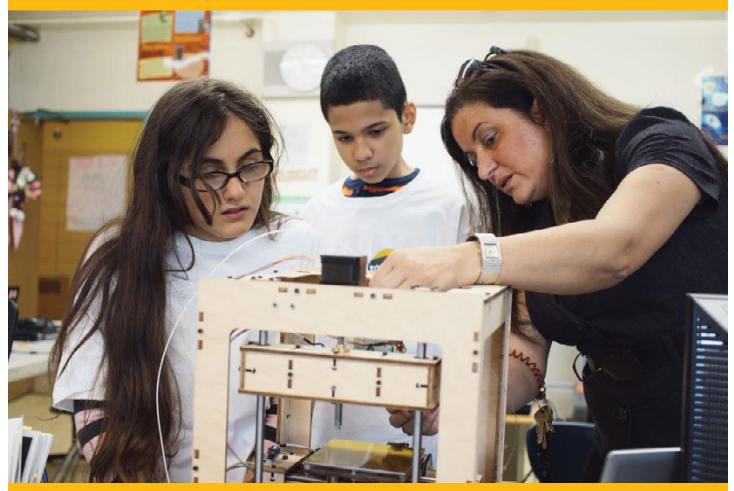11 Hargittai, Eszter; Fullerton, Lindsay; Menchen-Trevino, Ericka; and Thomas, Kristin Yates, "Trust Online: Young Adults' Evaluation of Web Content," *International Journal of Communication*, 4, 468-494, 2010.
12 Dahlstrohm, Eden; de Boor, Tom; Grunwald, Peter; and Vockley, Martha, "National Study of Undergraduates and Information Technology," Educause Center for Applied Research and Grunwald Associates LLC, 2011, http://www.grunwald.com/pdfs/EDUCAUSE_Grunwald_College_Student_Tech_Study.pdf, accessed on October 19, 2012.
13 Ibid

The digital and technical skills deficit is prevalent in the workplace as well. According to results from the 2012 Talent Shortage Survey, U.S. employers attribute a technical skills deficit for unfilled positions. Nationally, the top three jobs that employers are having difficulty filling are Trades, Engineers, and IT Staff.[14] The situation is similar in New York City. A task force from the City University of New York (CUNY) examined industry and labor force trends in several industry sectors that are of strategic importance to both CUNY and New York City's economy. Among key drivers and trends, the report highlighted:

> *Rapid technological change. It is hard to overstate the impact of technology on the way business is conducted and what will be required of the workforce. Far and away, respondents identified the frequency of technological changes as the most significant trend shaping the workforce today and well into the future. The transition from analog to digital in every industry has changed the skills required of the workforce and is driving a need for constant retraining, and for individuals who possess the ability to learn on the job.[15]*

Fortunately, over the past year employment in New York City has been on the rise. However, for New Yorkers to keep pace with evolving workplace demands, it is imperative that they possess a foundational technology skills base, as well as the digital literacy training to adapt to new technologies.

The Home Learning Environment

In-school investments to support digital literacy efforts are critical, yet equally important is the *home learning environment*. This includes the "material, informational, social, and psychological resources that are provided to children at home which, in turn, help them succeed in school."[16] It stands to reason that as technology becomes more mainstream

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14 "Talent Shortage Survey Research Results," Manpower Group, 2012, http://www.manpowergroup.us/campaigns/talent-shortage-2012/pdf/2012_Talent_Shortage_Survey_Results_US_FINALFINAL.pdf, accessed on November 26, 2012.

15 "Jobs for New York's Future: Report of The City University of New York Jobs Task Force 2012," City University of New York, http://www.cuny.edu/news/publications/jobtaskforce.pdf, accessed on January 7, 2013.

16 Tskikalas, Kallen; Lee, Jihyun; and Newkirk, Christine, "Home computing, school engagement and academic achievement of low-income adolescents: Findings from Year One of a Three-Year Study of the CFY Intervention," Computers for Youth Foundation, Inc., 2007.

BRIDGING THE DIGITAL LITERACY DIVIDE

Disparities in computer ownership and broadband adoption exist, and failing to address these disparities not only risks mitigating the benefits, but also leaving some behind...
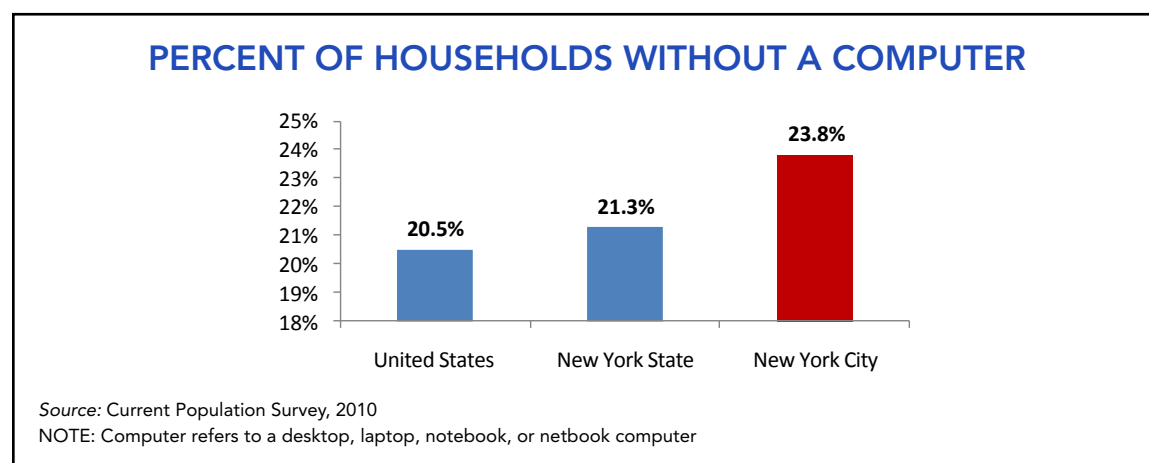
in the classroom, students will be expected to complete assignments using computers and the Internet at home.

In fact, the New York City Department of Education's (DOE) 5-Year Information Technology Strategic Plan states that students should have "ubiquitous access" to technology. The plan aims to provide "access to NYCDOE network services from anywhere, anytime using any device" adding that "it is not hard to see the value of allowing students to access these [school-based] systems from home—presumably where they are located when they do their homework and thus where such access would be most valuable."[17]

However, this approach presupposes that all students have access to a computer and high-speed Internet at home, which is not the case.[18] Disparities in computer ownership and broadband adoption exist, and failing to address these disparities not only risks mitigating the benefits, but also leaving some behind – thereby exacerbating existing inequities and perpetuating racial and ethnic achievement gaps.

Computer Ownership

In New York City, the portion of residents who do not live in a household with a desktop, laptop, notebook, or netbook computer at home (either owned by them or another householder) is 23.8 percent, slightly above both national and statewide rates.[19]

PERCENT OF HOUSEHOLDS WITHOUT A COMPUTER

	United States	New York State	New York City
	20.5%	21.3%	23.8%

Source: Current Population Survey, 2010
NOTE: Computer refers to a desktop, laptop, notebook, or netbook computer

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17 New York City Department of Education, "5-Year Information Technology Strategic Plan," Version 3.1, October 2011.
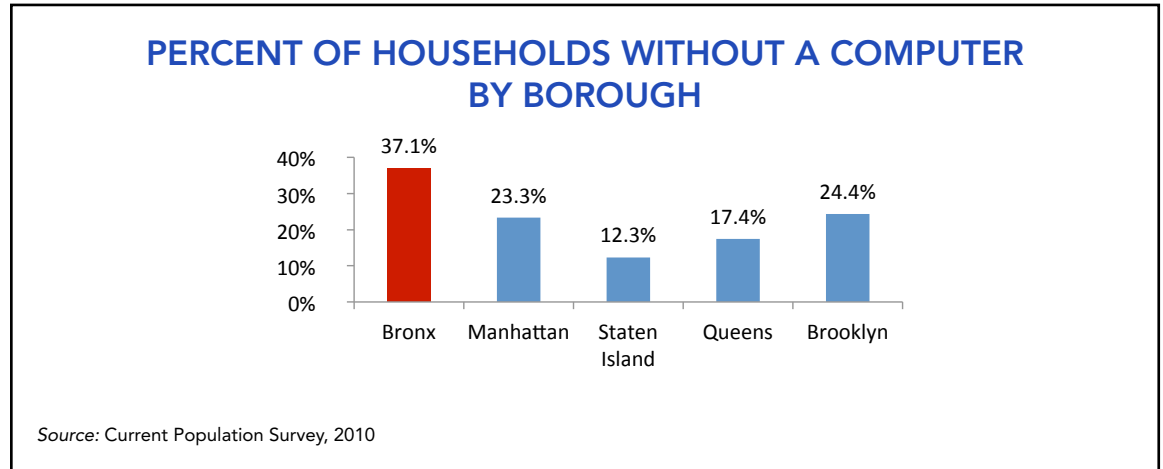18 Throughout this report "broadband" is used to refer to any kind of high-speed, continuous Internet access via such modes as DSL, cable, or fiber optics. A dial-up connection lacks the data transmission capacity (bandwidth) to maximize online content.
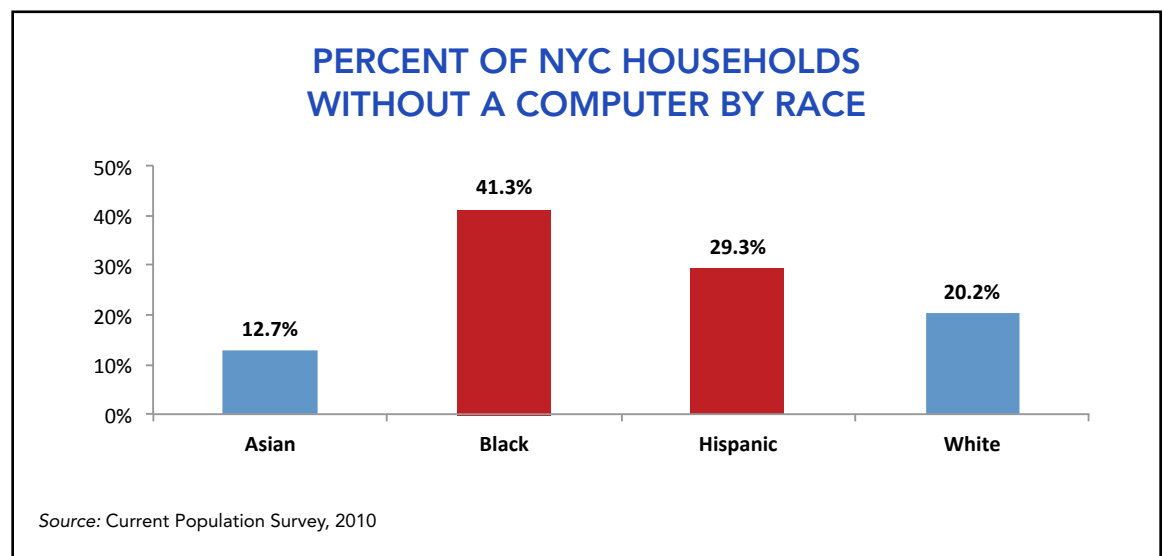19 Current Population Survey, Internet and Computer Use Supplement, October 2010.

BEYOND HIGH SCHOOL|NYC

NEW YORK CITY COMPTROLLER JOHN C. LIU

APRIL 2013

5

The rate of computer ownership also varies considerably by borough, ethnicity, and race. The Bronx has the highest rate of individuals reporting that they live in a household that *lacks* a computer: 37.1 percent.

PERCENT OF HOUSEHOLDS WITHOUT A COMPUTER BY BOROUGH

Borough	Percent
Bronx	37.1%
Manhattan	23.3%
Staten Island	12.3%
Queens	17.4%
Brooklyn	24.4%

Source: Current Population Survey, 2010

Meanwhile, the portion of Hispanics who live in a household lacking a computer is 29.3 percent, compared to 21.6 percent of non-Hispanics. A breakdown by race reveals that 41.3 percent of non-Hispanic Blacks lack a household computer compared to just 20.2 percent of non-Hispanic Whites and 12.7 percent of Asians.

PERCENT OF NYC HOUSEHOLDS WITHOUT A COMPUTER BY RACE

Race	Percent
Asian	12.7%
Black	41.3%
Hispanic	29.3%
White	20.2%

Source: Current Population Survey, 2010

What is more, 50 percent of families of students in high-poverty middle schools do not have a broadband-connected computer.[20]

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[20] These are the findings of detailed surveys of 21,000 families conducted over three years by CFY at middle schools throughout the City. Email from Mark Malaspina, President of CFY, January 16, 2013.
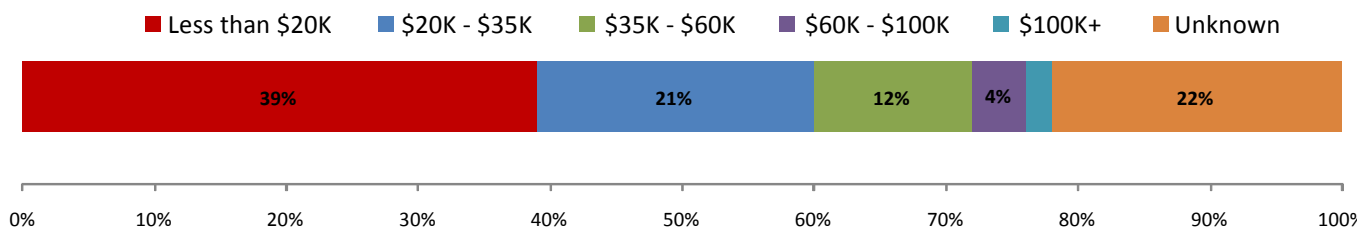
Home computer ownership has been associated with improved educational outcomes and increased high school graduation rates. A study of 174 majority low-achieving middle school students in New York City found that home computer and Internet use for self-regulated learning explained 14 percent of the increase in math test scores over one year.[21] And a discussion paper from the Board of Governors of the Federal Reserve System found that home computer ownership among teenagers increased the likelihood of high school graduation by 6 to 8 percentage points.[22]

Broadband Adoption

Home broadband adoption rates in New York City mirror those of computer ownership. Despite nearly universal broadband availability, more than one quarter (26.7%) of households still do not subscribe to broadband.[23] The heads of these households are disproportionately low-income.[24]

ANNUAL INCOME OF NYC HOUSEHOLDS WITHOUT BROADBAND

■ Less than $20K ■ $20K - $35K ■ $35K - $60K ■ $60K - $100K ■ $100K+ ■ Unknown

39%	21%	12%	4%		22%

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Source: Center for Survey Research at SUNY Stony Brook , 2011

21 Tsikalas, Kallen; Lee, Jihyun; and Newkirk, Christine, "Home Computing, school engagement and academic achievement of low-income adolescents: Findings from one year of a three-year study of the CFY Intervention," Computers for Youth Foundation Inc., 2007.

22 Beltran, Daniel O.; Das, Kuntal K; and Fairlie, Robert W., "Home Computers and Educational Outcomes: Evidence from the NLSY97 and CPS," November 2008, http://www.federalreserve.gov/pubs/ifdp/2008/958/default.htm, accessed on October 1, 2012. Note: The study controls for individual, parental, and family characteristics.
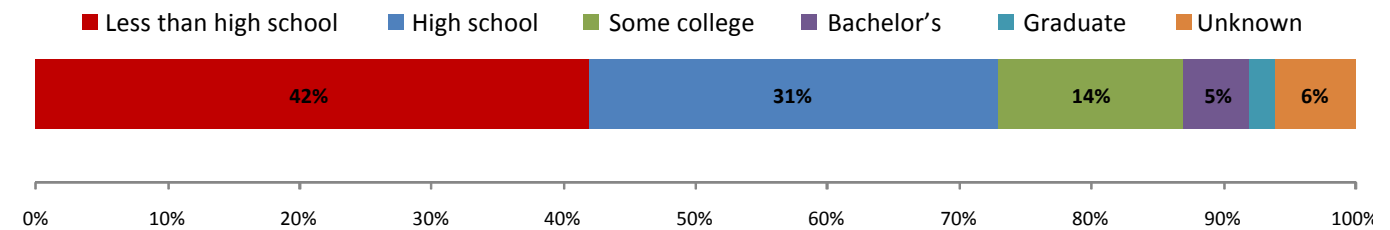
23 The survey asks heads of households whether they have broadband and, for those that have it, how they use it. For those without broadband the survey asks a range of questions about why not. A detailed description of the survey methodology and the questions asked are available in the publication *Broadband Internet Service Adoption and Use in New York State Households* available here: http://www.ctg.albany.edu/publications/reports/broadband_survey.

24 New York City Comptroller's Office analysis of survey data for New York City from SUNY's New York State Broadband Adoption Survey, and New York City Housing and Vacancy Survey, 2011, Microdata.

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Educational attainment is also a factor. About 42 percent of NYC households without broadband are headed by those without a high school diploma, and 73 percent of householders without broadband did not attend college.
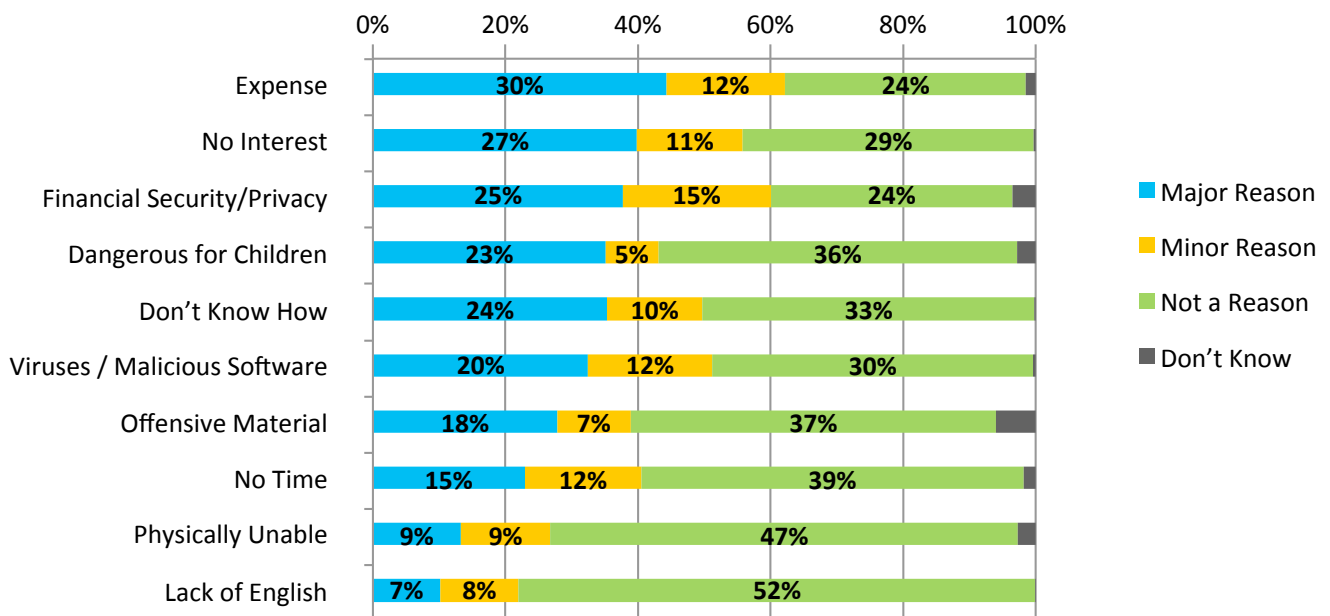
EDUCATIONAL ATTAINMENT OF NYC HOUSEHOLDS WITHOUT BROADBAND

Legend: ■ Less than high school ■ High school ■ Some college ■ Bachelor's ■ Graduate ■ Unknown

Less than high school	High school	Some college	Bachelor's	Graduate	Unknown
42%	31%	14%	5%		6%

Source: Center for Survey Research at SUNY Stony Brook, 2011

Reasons for non-adoption among New Yorkers are varied. As indicated in the graph below, the primary reason cited is expense, followed by "No Interest," (more than 55 percent) suggesting people do not understand or, perhaps, do not value the benefits of broadband at home.

REASONS FOR NOT HAVING BROADBAND

Reason	Major Reason	Minor Reason	Not a Reason
Expense	30%	12%	24%
No Interest	27%	11%	29%
Financial Security/Privacy	25%	15%	24%
Dangerous for Children	23%	5%	36%
Don't Know How	24%	10%	33%
Viruses / Malicious Software	20%	12%	30%
Offensive Material	18%	7%	37%
No Time	15%	12%	39%
Physically Unable	9%	9%	47%
Lack of English	7%	8%	52%

Legend: ■ Major Reason ■ Minor Reason ■ Not a Reason ■ Don't Know

Source: Center for Survey Research at SUNY Stony Brook, 2011

However, there are also New Yorkers who may be interested in an Internet subscription but have not connected because they lack confidence in their digital literacy skills, such as their ability to protect themselves from harm online. This is represented by the nearly 60 percent of respondents who listed "Financial Security/Privacy" and the nearly 55 percent who listed "Don't Know How" as reasons for not adopting broadband. It's also important to note that more than 40 percent of respondents believed the Internet was "Dangerous for Children," perhaps suggesting that they both do not appreciate the Internet's academic benefits and they do not know how to monitor online content.

Photo: Karl Otero Photography

Still, a home broadband connection has been found to not only support student success, but "may be critical to leveling the educational playing field."

Still, a home broadband connection has been found to not only support student success, but "may be critical to leveling the educational playing field."[25] One study of 140 African American children, who were largely low-income and resided in single parent households, found that Internet usage was correlated with higher test scores in reading. The authors attributed this to text-heavy web pages that children used, regardless of personal or academic use. The study also found that one year after home access to the Internet, students had higher grade point averages.

25 Jackson, Linda A.; Von Eye, Alexander; Biocca, Frank A.; Barbatsis, Gretchen; Zhao, Yong, and Fitzgerald, Hiram E., "Does home Internet use Influence the academic performance of low income children?" *Developmental Psychology*, 42 (3), May 2006, 429-435.

Recommendations

To meaningfully advance digital learning for all NYC public school students, the DOE's current planned investments must be complemented by strategies to increase access to technological resources in the home, most notably computers, high-speed Internet, and digital literacy for the entire family.

I. Support *CFY* and expand to all qualifying NYC middle schools[26]

The CFY program supports families' home environments by providing the necessary physical inputs and developing the supportive structures to increase home computer ownership, increase broadband adoption, and improve family digital literacy skills.

First, participating families are provided a refurbished home computer that is pre-loaded with educational software. CFY provides families with access to over 1,600 carefully selected free digital learning activities via CFY's PowerMyLearning platform, plus free subscriptions to additional online educational content. CFY families receive free technical support through a 24/7 bilingual help desk. CFY then offers information about affordable broadband options, including special broadband discounts via their corporate partners, Time Warner Cable and Cablevision.[27] To cultivate the psychological and social supports essential to the home learning environment, CFY requires participating families to attend Family Learning Workshops at students' schools. At these workshops, children and their families learn about a variety of digital learning topics and participate in activities together, including learning how to set up their new computer. CFY also provides professional development for educators to help teachers use online activities in the classroom and support online learning at home. Finally, the nonprofit supports school leaders in adopting new instructional approaches and deepening the connection between schools and families.

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26 CFY originally stood for Computers for Youth, but the nonprofit formally changed to CFY in September of 2011.
27 The discount program varies by company. Time Warner Cable provides the first year of service for free, and charges $9.95 per month for the second year, $14.95 for the third year, and $19.95 for the fourth and fifth years. Cablevision charges $14.95 for the first three years (there is no free option) and $19.95 for the fourth and fifth years.

Benefits

CFY first began serving NYC students at a school in the South Bronx in 1999.[28] After ten years of working with thousands of NYC middle school students, CFY became the lead program partner in NYC Connected Learning, an initiative fueled by a $22 million grant to improve the home learning environment and increase broadband adoption, awarded by the U.S. Department of Commerce's Broadband Technology Opportunities Program (BTOP) to the City's Department of Information Technology and Telecommunications.[29] CFY's work was highlighted at an event commemorating the three-year anniversary of BTOP held at the National Telecommunications and Information Administration, and CFY was one of only four nationwide to be invited to sit on a panel discussion at the event.[30]

CFY IMPACT ON BROADBAND

Source: CFY, October 2010-June 2012
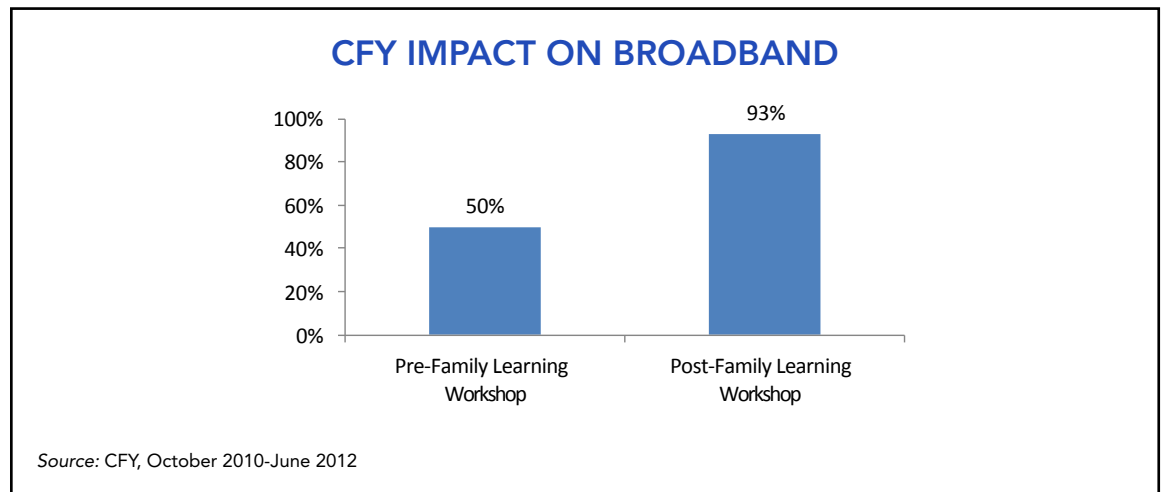
CFY's prominent role in Connected Learning is a testament to its proven track record of success. Three months after participating in the Family Learning Workshops, the use of an "educationally-focused computer" to complete homework and access educational software increased from 21 percent to 100 percent. Broadband adoption increased from 50 percent to 93 percent.[31] What is more, 79 percent of the 7,570 families that were new broadband adopters chose not to use the discounted rate that Time Warner Cable and Cablevision offers specifically to CFY participants. These rates tend to have slower download and upload speeds, and therefore slower connections. For instance, Time Warner Cable's discount program offered to CFY families includes a download speed of

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28 CFY, "History," http://cfy.org/about-us/history/, accessed on February 28, 2013.
29 National Telecommunications and Information Administration, U.S. Department of Commerce, "New York City Department of Information Technology and Telecommunications," http://www2.ntia.doc.gov/grantees/NYCDeptITT, accessed on February 28, 2013.
30 National Telecommunications and Information Administration, U.S. Department of Commerce, "NTIA Administrator Strickling Delivers Remarks at the Brookings Institute on Broadband Technologies Opportunity Program," January 16, 2013, http://www.ntia.doc.gov/press-release/2013/ntia-administrator-strickling-delivers-remarks-brookings-institution, accessed on February 28, 2013.
31 Email message to the author from Cindy Menz-Erb, Executive Director of CFY-NYC, October 12, 2012. While only 21 percent of families had an educationally-focused computer, 71 percent had a computer of some kind, which is nearly identical to the ownership rates among NYC Hispanics (70.7%). This suggests that the percent of families with a computer used for educational purposes may be lower than the percent that the CPS indicates owns any computer.

1.5 Mbps and an upload speed of 512 Kbps.[32] Yet the company advertises speeds about twice as fast through its most basic plan on the market, up to 3 Mbps for download and 1 Mbps for upload.[33] This suggests that the CFY program helps parents appreciate the value of adoption and encourages them to pay more for a faster connection.

Parent engagement also increased as a result of CFY. Traditionally, parent engagement tends to drop as students progress in grade level, beginning in middle school. This is demonstrated by the dramatic decrease in parent attendance at Parent-Teacher Conferences.[34] Given CFY's focus on engaging the entire family, parents naturally become more involved in their child's academics during a stage when engagement normally declines. Moreover, according to a Post-Family Learning Workshop parent survey, 96 percent of parents felt more connected to their child's school as a result of CFY.[35]

Program Expansion

Currently CFY operates in 41 schools, and from October 2010 through June 2012, served 17,762 families, which was largely funded by the federal BTOP grant.[36] This grant expires on December 31st, 2013. This report recommends not only supporting funding for the 41 schools already operating a CFY program, but also expanding funding to all schools with 6th grade students in which at least 75 percent of students receive free or reduced lunch (approximately 320 schools).[37]

CFY reports that the per student cost of the program is between $400 and $700, depending on hardware and software donations.[38] According to the DOE's reported 6th grade enrollment at these schools, roughly 40,000 6th grade students would qualify for CFY.[39] To maintain and expand the program to these students would cost between $16.1 million and $28.2 million dollars per year.

32 Email message to the author from Cindy Menz-Erb, Executive Director of CFY-NYC, September 5, 2012.
33 Time Warner Cable, "Internet," http://www.timewarnercable.com/en/residential-home/internet/plans.html, accessed on October 18, 2012.
34 Answers to question 16a in the Department of Education's 2012 Teacher Survey data for community schools revealed that 83.5 percent of teachers reported that the majority of students in Early Childhood Education schools had at least one parent attend their Parent-Teacher Conferences. The proportion fell to 60.1 percent among standalone middle schools and 33.7 percent among standalone high schools. See http://schools.nyc.gov/Accountability/tools/survey/default.htm
35 Email message to the author from Cindy Menz-Erb, Executive Director of CFY-NYC, September 5, 2012.
36 Ibid. For a full list of participating schools, please see http://cfy.org/locations/new-york-city/#schools, accessed on October 15, 2012.
37 According to the New York City Department of Education's Demographics and Accountability Snapshot, available at http://schools.nyc.gov/Accountability/data/default.htm, in 2011-2012 there were 240 schools that would qualify for participation in CFY because they had 6th grade students and at least 75 percent of all students received free or reduced price lunch. This changes yearly, and the average number of qualifying schools in the past three academic years was 319 schools.
38 Discussion with Cindy Menz-Erb, Executive Director of CFY-NYC, October 27, 2012.
39 The average number of 6th grade students and the average number of schools with 6th graders are tabulated from the New York City Department of Education's Demographics and Accountability Snapshot, found at http://schools.nyc.gov/Accountability/data/default.htm. The averages are only taken of the last three academic years (2009-2010, 2010-2011, and 2011-2012) because previously, the Snapshot only included a free lunch metric, not free and reduced price lunch. The Snapshot also does not isolate free lunch for the past three years, and instead provides the combined metric for free and reduced price lunch.

II. Expand MOUSE Squad

Part of the costs of CFY could be recouped through savings generated via another digital literacy program known as MOUSE. This youth development program trains students to handle technological repairs in school, empowering them with digital skills and enabling schools to spend less on tech repair services. MOUSE currently serves students in 90 schools in all five boroughs.[40] MOUSE Squad students, predominantly in middle or high schools, are trained to become digital media and technology experts through a comprehensive, standards-based, online curriculum that covers computer troubleshooting, help desk operations, customer service, and critical 21st century skills. Schools hosting a MOUSE Squad have an appointed Staff Coordinator who meets with students at least once per week to complete the 10-module curriculum, which can be taught as a tech elective, a club, or an extracurricular activity. After completing the curriculum and becoming certified as MOUSE Squad technicians, students can begin working on tech repair tasks assigned to them through a ticket system monitored by the Staff Coordinator.

According to the annual program evaluations, 96 percent reported an improvement in communications, problem solving, team building, and leadership skills...

The benefits of MOUSE are multifold. First, students learn valuable technology repair skills which benefit their schools directly. Also, participants report that MOUSE has positively impacted their academic and career aspirations. According to the annual program evaluations, 96 percent reported an improvement in communications, problem solving, team building, and leadership skills; 87 percent were better prepared for college; and 87 percent were more motivated to pursue careers in technology, science, math, or engineering.[41] These positive outcomes have generated significant recognition for MOUSE across the country. The program was featured for its "unique approach to providing technical support in schools" in a 2010 study commissioned by the U.S. Chamber of Commerce.[42] MOUSE has also been recognized in two textbooks that provide guidance to IT service desks for the program's ability to equip students with the customer service skills to manage a school technical help desk, while simultaneously broadening students' life experiences and providing motivation to succeed academically.[43]

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40 Phone conversation with MOUSE's Director of Development, Mike Capobianco, and Membership Manager, Naomi Solomon, November 8th, 2012. (MOUSE originally stood for Making Opportunities for Upgrading Student Education, but today simply goes by MOUSE.)

41 MOUSE, "About MOUSE," http://www.mouse.org/about-mouse, accessed on November 21, 2012.

42 U.S. Chamber of Commerce, "The Impact of Broadband on Education," December 2010, http://www.uschamber.com/sites/default/files/about/US_Chamber_Paper_on_Broadband_and_Education.pdf, accessed on February 28, 2013.

43 MOUSE, "Awards and Publications," http://www.mouse.org/news-events/awards-publications, accessed on February 28, 2013.

The program also yields meaningful financial benefits via the cost savings generated by in-house tech support. It costs MOUSE $5,000 to operate a program per school annually, inclusive of administrative and programmatic costs (such as office support, curriculum content, training, webinars, kits for schools, etc).[44] On average, schools that are running a fully functional MOUSE Squad help desk can save a school up to $19,000 on technology support costs compared to their non-MOUSE counterparts.[45] To fund MOUSE in the City's 1,079 public middle and high schools would cost $5.4 million. Net savings would potentially exceed $15 million.[46] The program generates savings as schools decrease their dependence on non-staff consultants and contractors who must travel to the school and charge fees. Since MOUSE participants respond quickly to tech repair demands, schools also decrease the downtime of critical technology. MOUSE relies on adult instructors, staff, and supervisors at the school to ensure its success. It is the integration of youth and adult mentorship, learning and professional development that is key to each student realizing the full impact of the program.

III. Create free computer program for low-income college-bound students

The City can support low-income high school graduates in their academic careers beyond high school by partnering with companies that refurbish computers to provide home computers to those who are college-bound, i.e. enrolled in a 2- or 4-year post-secondary degree. Ideally, the program would incentivize current high school students, as well as support student success once enrolled in college.

A 2011 study of financial aid recipient students at a large community college found that minority students, in particular, exhibited better educational outcomes after receiving a free home computer.[47] The authors suggest the disproportionate improvement for minorities may be due to the overall lower rates of computer ownership among these populations. That is, a free computer has a larger relative impact.

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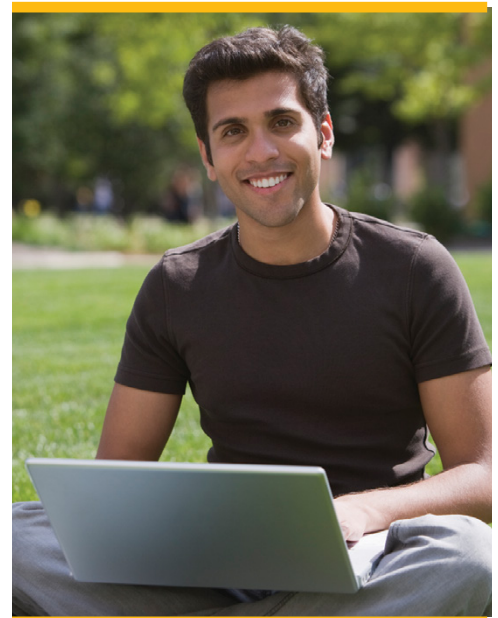
44 Currently a school pays a $999 annual membership fee and MOUSE covers the remaining $4,000.
45 Citi financials metrics analysis, 2004 - 05, studying schools in New York City running MOUSE Squad help desks," MOUSE. Not publicly available.
46 The 1,079 schools includes all K-8, middle schools, high schools, transfer high schools, and Young Adult Borough Centers. New York City Department of Education, "2011/2012 Progress Report Results for all Schools," November 21, 2012, http://schools.nyc.gov/Accountability/tools/report/default.htm, accessed on November 28, 2012.
47 Fairlie, Robert W., "Academic Achievement, Technology, and Race: Experimental Evidence," University of California, Santa Cruz, October 2011.

Through this program, students would be eligible to apply for a free computer if they 1) are graduates of an NYC public high school, 2) had been enrolled in the free lunch program at their high school, and 3) are enrolled in a 2- or 4-year college within six months of graduating from high school. The cost to refurbish computers varies, but a conservative estimate is $300 per computer.[48] Based on 2011-2012 academic year achievement and graduation rates, about 18,000 students would qualify for this program annually, at a cost of $5.4 million.[49]

IV. Require businesses who receive technology and communication grants to donate "used-but-still-useful" computers for educational support

According to Gartner Research, businesses only donate 3 percent of the computers they replace every year. Consequently, more than 17 million "used-but-still-useful" corporate PCs are discarded or stored in a warehouse every year across the country. Seventy-five percent of these wasted computers are just four years old or less.[50]

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The City can increase computer donations by requiring businesses that receive grants through its technology and connectivity initiatives to donate their unwanted but usable computers. For instance, the City plans to award $12 million worth of free fiber wiring over two years to small- and medium-sized commercial and industrial businesses across the five boroughs, with the average wiring upgrade package valued at $50,000.[51] Two-hundred forty businesses will receive this benefit—here is an opportunity for these businesses to give back.

The National Cristina Foundation (NCF) could facilitate the donation process. NCF works to promote technology reuse by connecting companies looking to donate used computers and other electronic

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48 Based on $280 estimate provided by Per Scholas, a nonprofit that previously refurbished computers. Conversation with Kenneth Walker, VP of Strategic Initiatives, Per Scholas, January 3, 2013.

49 According to the School Demographics and Accountability Snapshot available through the DOE website at: http://schools.nyc.gov/Accountability/data/default.htm, there were 57,062 students in the 12th grade in the 2011-2012 academic year. The DOE's High School Progress Report, available at http://schools.nyc.gov/Accountability/tools/report/default.htm, provides the percent of students in each school enrolled in the free lunch program. This rate applies to the whole school and is not broken down by grade. If we assume that the overall rate is the same for 12th grade students, then about 33,909 12th grade students were enrolled in the free lunch program in 2011-2012. This was obtained by multiplying the free lunch rate by number of 12th grade students for each school listed in the High School Progress Report, and then taking the sum from all schools. The High School Progress Report also provides each school's college enrollment rate within six months of graduating from high school. Notably, this rate applies to the cohort of students who graduated from high school in 2011, not 2012. We assumed that this rate is more or less constant and applied it to the 2011-2012 seniors in each school by multiplying it by our estimate for the number of seniors in each school that were enrolled in free lunch. When we sum this total for all schools, we find that 17,844 twelfth grade students qualified for free lunch and were enrolled in a 2- or 4-year college within 6 months of graduating from high school. Therefore, this is how many students we might expect to be eligible for the program. NOTE: this analysis did not include the schools listed in the Transfer High Schools Progress Report.

50 Federal Communications Commission, "FCC Chairman, C2C, Redemtech Announce 'PC Pledge 100' Campaign," August 7, 2012, http://www.fcc.gov/document/fcc-chairman-c2c-redemtech-announce-pc-pledge-100-campaign, accessed on October 19, 2012.

51 "ConnectNYC Fiber Challenge," http://nycfiberchallenge.com/, accessed on October 19, 2012.

hardware with local charities or schools in their area.[52] What is more, currently NCF is partnering with nearly 1,000 nonprofits and public schools in New York City that are seeking computers to serve three target populations: individuals with disabilities, at-risk students, and those who are economically disadvantaged.[53]

V. Promote digital literacy training and resources

There has been a recent push, both federally and locally, to increase digital literacy training. For instance, the federally-funded Connected Communities initiative will create or upgrade about 100 public computing centers over the next few years using American Recovery and Reinvestment Act funds. Time Warner Cable will create 40 new computer technology centers as a result of its franchise contract renewal with the City which took place in the summer of 2012.[54]

The City can help New Yorkers to identify these trainings by posting information on various City websites including that of the New York City Department of Information Technology & Telecommunications (DoITT) and the 311 website. DoITT already addresses the importance of broadband adoption and provides an overview of stimulus programs.[55] Ideally, specific information about trainings from all kinds of organizations, including community-based organizations, educational nonprofits, libraries, public housing, etc., would be aggregated so that New Yorkers could search for trainings near them. At the national level, Connect2Compete has launched a search engine on their website where individuals can look up programs by zip code.[56] However, the list is not comprehensive and would be better managed at the local level where many, smaller programs could be catalogued.

Moreover, information about digital literacy trainings and anticipated discounted broadband programs could easily be distributed at government offices that provide

52 See http://www.cristina.org/, accessed on January 8, 2013.
53 Conversation with Harry Rizer, Executive Director of the National Cristina Foundation, December 27, 2012.
54 "Digital Roadmap NYC," August 2012, http://www.nyc.gov/html/digital/downloads/pdf/digitalroadmap2012.pdf, accessed on October 22, 2012.
55 See http://www.nyc.gov/html/doitt/html/home/home.shtml, accessed on January 8, 2013.
56 "Training Site," Connect2Compete, http://www.connect2compete.org/locator, accessed on October 18, 2012.

direct services to New Yorkers. For example, the NYC Department of Small Businesses' 15 Workforce1 Centers help prepare and connect unemployed and qualified New Yorkers with businesses, and represent an excellent access point to reach non-adopters, given the Internet's substantial role in searching for and applying to jobs.

Conclusion

New York City must prepare its K-12 students to learn and work in a digital environment. By encouraging digital literacy skill development in the home, students will best be prepared to take on what happens in the classroom and eventually, the workplace. The City can promote increased home computer ownership, home broadband adoption, and build a strong foundation of digital literacy by expanding the CFY program to all qualifying middle schools. The costs of this program can be partially offset by expanding the MOUSE Squad, which not only saves schools money in technological repairs, but arms students with technology and software skills to prepare them for college and beyond. The City can support low-income high school graduates in college by providing them with a free computer. Businesses who receive the City's digital grant awards can increase access and prevent waste by donating their "used-but-still-usable" computers to local nonprofits that serve people with disabilities, at-risk students, and the economically disadvantaged. Finally, the City can play a valuable role in encouraging home broadband adoption by promoting digital literacy trainings on its various websites and at government offices. Together, these recommendations will better prepare NYC's youth and families to cultivate the digital competencies required to succeed in today's classrooms and workplaces.

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