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REPORT



# THE NEW CTE

## NEW YORK CITY AS LABORATORY FOR AMERICA

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# Contents

Executive Summary.....	5
<b>I.</b> Introduction.....	9
<b>II.</b> Background.....	11
<b>III.</b> Schools, Students, Outcomes.....	13
<b>IV.</b> Implementing the Essentials.....	16
<b>V.</b> Policy Recommendations.....	24
<b>VI.</b> Conclusion.....	27
Endnotes.....	28

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## Executive Summary

Once one of the most disparaged forms of education in the United States, what used to be called “vocational education”—now renamed “career and technical education,” or CTE—has emerged in the past decade as one of the most promising approaches to preparing students for the future. New York City is at the forefront of the national revolution in career education. City and state government are strongly committed to the new CTE, and together, they have been reforming and revitalizing the city’s CTE offerings for nearly a decade, with support from business, labor, the media, the City University of New York, and the Bill & Melinda Gates Foundation.

Some 50 of the city’s roughly 400 high schools are dedicated exclusively to CTE. Nearly 75 others maintain 220 additional CTE programs—effectively, schools within schools, where students can concentrate in a CTE subject area. Some 40 percent of New York City teens take at least one CTE course while in high school; nearly 10 percent attend a dedicated CTE school. And several New York innovations—including company-sponsored “early-college high schools,” where students earn a high school diploma and an associate’s degree—are being replicated across the United States.

Still, as New York CTE educators have found, revolutions do not take hold overnight. The first big breakthroughs must be followed by implementation, and the second stage is often when the most important changes occur. In 2016, the New York CTE movement has entered this second stage, as schools across the city work to realize the policy innovations of the last decade. Nearly half the city’s dedicated CTE schools are new; many can’t yet point to a full class of graduates. The front lines of innovation have shifted from offices in Manhattan and Albany out to schools across the five boroughs. And while New York is on the cutting edge of the national push to reinvent CTE, it’s still a work in progress—a laboratory for the nation.

This paper aims to capture the New York City CTE movement at a critical midpoint, highlighting the promise and the work still to be done.

New York CTE programs vary widely and span the gamut of skills and students. Many specialize in a single industry, from culinary arts and construction to pre-engineering and information technology. Some serve primarily underprivileged students who are eligible for free and reduced-price lunch. Others are so popular with middle-class families that they have trouble balancing their student bodies to enroll a representative cross-section of New Yorkers. But all must meet the same ambitious mandate: preparing students for college and careers. New York State requires all students, whether or not they attend CTE programs, to meet the same academic standards and pass the same demanding school exit exams. And those enrolled in CTE programs face an additional set of requirements: mandated “work-based learning” and technical assessments of the occupational skills that they have acquired in high school.

Available data are still limited, and there is much that we don’t know. But early evidence suggests that the new CTE is producing results in New York. Occupational course offerings are largely aligned with the industries in the metro area, including high-growth sectors such as information technology, computer programming, and nursing. Class size tends to be smaller in CTE schools, enabling greater focus and engagement by students. Evidence suggests that young people who attend CTE schools have better attendance rates and are more likely to graduate. And it appears that students in comprehensive high schools with CTE programs score better on standardized tests than those at schools with no CTE offerings: a larger share of those in schools with CTE classes score at, or above, “proficient” on English and math tests.

The challenges fall on five broad fronts, as New York educators struggle to implement five widely agreed-upon tenets of the national CTE movement:

1. **Prepare students for college and careers, allowing young people to keep their options open.** New York CTE programs work to integrate vocational content into academic course offerings. Teachers struggle to find time for everything that students need to accomplish: seat time in academic classes as well as work-based learning requirements. CTE educators universally endorse the tough standards that require their students to pass the same Regents exit exams as students in strictly academic schools while also learning an occupational skill. Teachers and students alike endorse the principle of “learning by doing.” But integrating academic work and technical training is easier said than done, and results vary widely across the New York system.
2. **Engage business and industry.** New York City is blessed with a handful of large, high-profile companies that saw the promise of CTE early on and invested heavily, including IBM and the giant utility Con Edison. But in New York, as nationwide, it’s difficult to persuade most businesses to engage: to partner with CTE schools, help plan curricula, mentor students, and provide opportunities for internships. State regulations require every approved CTE program to have an industry partner; but maintaining the relationship takes time and effort on both sides. Schools lack dedicated staff, many companies don’t understand what they’re signing up for, and many schools are struggling to make the relationship meaningful.
3. **Build a bridge from secondary to postsecondary education or training.** It’s a hallmark of the new CTE nationwide: good programs aim to bridge the gap between secondary and postsecondary education, easing the transition for students who might otherwise lose their way. New York’s pioneering early-college high schools are a model of what’s possible, and state regulations require every approved CTE program to maintain an articulation agreement with a community college. But these relationships, too, can be difficult to build and maintain—and are more time-consuming than many schools can handle with existing resources.
4. **Create opportunities for students to work.** The pinnacle of the CTE experience—what makes it different from a traditional academic education—is work-based learning. This is a broad, catch-all category that covers many kinds of experiences: from career exploration—guest speakers, field trips, job shadowing, and career fairs—to actual work on the job at a company or in the public sector. New York State mandates that approved CTE programs offer a robust gamut of work-based learning, and educators across the five boroughs are having considerable success with field trips, job shadowing, mentoring, and other innovative practices. Where they are falling short: bona fide on-the-job work experience. According to a 2015 survey conducted by PwC for a business group, the Partnership for New York City, only 1,575 students—less than 2 percent of all New York CTE students and less than 5 percent of seniors—completed internships in 2014.
5. **Embrace industry-recognized occupational credentials.** The New York State Education Department took a dramatic step in 2015, allowing students to substitute industry-approved skills tests—competency-based performance assessments in, say, metalworking or computer networking—for one of the five Regents exams that they must pass to graduate from high school. This was a powerful boost for CTE across the state. But the promise of the new policy has not been fully realized because the state bureaucracy isn’t keeping up with new technology. Only 14 technical assessments have been approved in Albany; many measure outmoded skills or have little currency with employers. So, too, with CTE teacher certification and the state CTE program approval process: educators across the city complain that state standards are inflexible and out of date—that they don’t measure the right things or reflect emerging technology.<sup>1</sup>

The New York education establishment has committed to a bold course, embracing the new CTE on an impressive scale. But much work remains to be done to translate this cutting-edge vision into reality. This paper recommends two broad reforms: more on-the-job experience for students and new approval procedures in Albany to ensure that CTE course offerings align with the city’s rapidly changing economy.

### ***More Students Need Work Experience***

New York CTE students need to spend more time on the job in the workplace. The spectrum of work-based learning experiences offered in New York schools, including job shadowing, mentoring, career fairs, and skills competitions, are all valuable and rewarding. But not enough students make it to the culminating experience: an internship. New York can start to address this problem by overhauling state standards for work-based learning. What gets measured gets improved; standards should distinguish between career exposure and actual work experience, holding schools responsible for placing students in internships.

Along with this new mandate should come increased resources: funding and other help with the difficult task of placing interns. Educators in New York and elsewhere are divided about what works best to secure placements. Some maintain that educators alone can't do it—what's needed is an independent cohort of nonprofit “intermediaries” that build and sustain relationships between educators and employers. Others—often school-based personnel—argue that only the schools can play this role.

This paper proposes that the state provide CTE programs with supplementary funding dedicated to developing relationships with employers and placing students in the workplace, then allow school officials to spend the money as they see fit—on hiring in-house staff or paying for the services of an intermediary.

Together, these two reforms—a new mandate and new resources to meet it—ought to go a long way toward improving New York CTE students' opportunities for work experience. But even this package will not be enough if educators do not also make a third change: engaging employers looking to hire high-school graduates or associate's degree holders.

### ***A New Process for State Approval of CTE Teachers and Industry Credentials***

CTE educators across New York complain that state approval of CTE teachers and industry credentials is not keeping up with advances in the industries that partner with CTE programs. The current system in Albany is a traditional gatekeeper model. The state education department maintains lists of approved CTE schools, approved CTE career pathways, approved industry credentials, and approved CTE teacher certifications. For teachers and programs applying for approval in an existing category, the system works reasonably well. Problems arise when there is no box in the taxonomy for an emerging industry or occupation—an aquaculture specialist, for example, or an emergency-management technician.

A better, more accommodating approach would abandon the taxonomy. Schools and their industry partners would apply for approval, just as they do now. But instead of maintaining a list of categories that educators have to demonstrate they fit into, under a new approach, the state would consider each application on its own merits. The questions would no longer be, Is it on the list? or Does it fit? but rather, Does it work for the situation that it's designed to work for—and does it meet appropriate criteria?

The payoff to reform of this kind would be greater flexibility and adaptability. Schools would be better positioned to respond to industry partners, and students would be better prepared to succeed in a rapidly changing job market, familiar with new technology and equipped with the latest, in-demand skills.

On the cutting edge, wrestling to implement the tenets of the CTE revolution, New York City holds vital lessons for educators across America. The challenge in the years ahead: to maintain the pace of innovation and take it to a next level. With a few modifications and continued support for career education, New York can remain in the vanguard, building the workforce of tomorrow and providing a model for the nation.





# THE NEW CTE

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## NEW YORK CITY AS LABORATORY FOR AMERICA

### I. Introduction

Once one of the most disparaged forms of education in the U.S., what used to be called “vocational education”—now renamed “career and technical education,” or CTE—has emerged in the past decade as one of the most promising approaches to preparing students for the future.

Demands for revamping career education began with employers: companies in a broad range of industries complained that the workers they hire don’t have the necessary skills to succeed on the job. But the “new CTE” movement now spans the political spectrum and includes parents, educators, and policymakers as well as employers.

Supporters have a common vision. Programs must be academically rigorous—and they should prepare young people for high-demand, high-paying jobs. Unlike the old vocational education, the new CTE aims to educate young people for further education as well as for careers. Students learn the rudiments of a technical trade and have an opportunity to learn and practice technical skills in a hands-on work environment. They acquire professional work habits, from punctuality to project management. But this preparation for the world of work isn’t at the expense of college readiness. On the contrary, in an era when one-third to half of all new jobs are expected to require more than high school but less than a four-year college degree, a principal goal of the new CTE is to prepare students for postsecondary education and training.

It's an enticing vision—a win-win for employers and young people, economic competitiveness, and opportunity—and it has taken off across the country. The federal government has endorsed the concept and enshrined it in law: the 2006 Carl D. Perkins Career and Technical Education Act.<sup>2</sup> Virtually every state in America has launched some kind of experiment, large or small, to implement the vision. Researchers are scrambling to take its measure. And New York City is in the vanguard of the movement—one of the first and largest American cities to commit, all-out, to the new CTE.

New York's push to reinvent CTE is nearly a decade old. Its first champions were Mayor Michael Bloomberg and his powerful schools chancellor, Joel Klein. Mayor Bill de Blasio has been no less enthusiastic. Both administrations have enjoyed strong support from virtually every corner that could be helpful: business, labor, the media, the City University of New York (CUNY), President Barack Obama, Governor Andrew Cuomo, and the Gates Foundation, which spent millions to jump-start the New York CTE revival and continues to subsidize key elements.

Some 50 of the city's roughly 400 high schools are now dedicated exclusively to CTE.<sup>3</sup> Nearly 75 others maintain 220 additional state-approved CTE programs—effectively, schools within schools, sometimes known as “career academies”—where students can concentrate in a CTE subject area and earn what the Department of Education calls a “CTE-endorsed diploma.”

These programs vary widely and span the gamut of skills and students. Many specialize in a single industry, from culinary arts and construction to pre-engineering and information technology. Some serve primarily underprivileged students eligible for free and reduced-price lunch. Others are so popular with middle-class families that they have trouble balancing their student bodies to meet the needs of a representative cross-section of New Yorkers.

National attention has focused on a small subset of New York schools: seven “early-college high schools” spanning grades 9–14, including the IBM-sponsored Pathways in Technology Early College High School (P-TECH), mentioned by President Obama in his 2013 State of the Union address.<sup>4</sup> But most New York CTE educators work far from the limelight and without accolades. Some 40 percent of New York City teens take at least one CTE course while in high school; roughly 26,000, nearly 10 percent of city high school students, attend a dedicated CTE school.<sup>5</sup>

This is a lot of change in just under a decade, but even the staunchest advocates agree that the New York CTE move-

ment is still a work in progress. Nearly half the city's dedicated CTE schools are new. Many can't yet point to a full class of graduates. Most are still working to build essential relationships with local colleges and employers. And city and state authorities are still struggling to adapt their standards to accommodate the new movement.

Two examples stand out: New York has embraced and institutionalized two of the most transformative elements in the new CTE credo. First, every CTE program in the city is required to have an “articulation agreement” that allows high school students to earn college credit at a local institution of higher learning—an accommodation fiercely resisted by many colleges and universities across the country. Second, the New York State Education Department agreed in 2015 to treat industry-approved technical tests—competency-based performance assessments in, say, metalworking or computer networking—as the equivalent of Regents examinations, allowing students to substitute a CTE assessment for one of the five Regents exams that they need to graduate from high school.<sup>6</sup>

These are dramatic changes, radical by any measure. But as New York CTE reformers are learning, they are only first steps. True transformation happens with implementation, and New York still has a long way to go.

This paper aims to capture the New York City CTE movement at a critical midpoint, highlighting both the promise and the work still to be done.

**Section II** briefly outlines the history of CTE in New York. **Section III** uses city, state, and federal data to paint a picture of the system as it stands today: the programs, the students, and what's known about who chooses CTE and about outcomes, including graduation rates. **Section IV** draws on some three dozen interviews and New York school visits, conducted in late 2015 and early 2016, to explore how the city is handling what CTE advocates see as the essential attributes of an effective CTE school: its relationship with business and industry; its relationship with a local college or university; and the commitment not to foreclose options, preparing students for college and careers. **Section V** offers policy recommendations.

This is a story of critical interest to New Yorkers—today's high school students are the city's future—but also more broadly. The New York CTE revival makes the city a laboratory for America. On the cutting edge, but learning the hard way just how far there is to go, New York City holds vital lessons for CTE reformers across the United States.



## II. Background

The recent growth of career and technical education in New York City extends a century-old tradition and mirrors the evolution of CTE across the U.S.—an evolution intended to help more students make successful transitions to college and the labor market. Also critically important in New York was the small-schools movement. A national initiative funded partly by the Gates Foundation, this movement closed many large comprehensive high schools with high dropout rates and replaced them with smaller schools, change designed to create a more personalized learning experience.<sup>7</sup>

The first “small schools of choice” opened in New York in 2004, but the movement did not immediately lead to change in career and technical education: no new CTE schools opened in the city between 1960 and 2008. In 2008, Mayor Bloomberg announced the results of a CTE task force urging the city to revise and expand the city’s CTE offerings.<sup>8</sup> In the following years, New York continued closing large schools and opening smaller ones, but with a focus on modernizing existing CTE programs and adding new schools dedicated to CTE.

Partner organizations played a key role in opening small schools of choice, and this has been particularly true for schools offering CTE. Like city-education authorities, partner organizations—companies, nonprofits, and educational institutions—sought to create new schools that offer college-preparatory curriculum and personalized academic support, while exposing students to the real-world tasks and professional expectations of a work environment.

One of the largest, most significant partnering organizations was CUNY, which has opened 17 schools in the last two decades, all with the explicit goal of ensuring a smooth, low-cost transition from high school to college. Of these 17 schools, seven have an explicit CTE focus and span grades 9–14, exposing students to postsecondary education and applied learning through a CTE curriculum.

CUNY’s efforts have been facilitated by private corporations, including IBM and Con Edison. Both companies partnered with CUNY and city authorities to design and invest in CTE programs that they hoped would produce a workforce ready to fill high-demand entry-level jobs in their field. While employer engagement is not new to CTE in New York, this level of partnership is unprecedented.

The Urban Assembly (UA) also helped design and launch schools for New York City. The UA Harbor School—opened in 2003 but later reoriented to focus on CTE—was the first new CTE-dedicated school in New York in nearly 50 years.<sup>9</sup> In the 2015–16 school year, UA was running 21 schools, seven of them dedicated to CTE themes. Thanks to these and other partners, the New York CTE landscape was changed substantially over the last decade (**Figure 1**).

### CTE Schools Opened in New York City Since 2010

**FIGURE 1.**

Fall Year Opened	School	Programs	Borough
2010	Academy for Health Affairs	Patient Care	Brooklyn
2012	Academy for Software Engineering	Software Engineering	Manhattan
2014	Benjamin Franklin High School for Finance & Information Technology	Information Technology and Finance	Queens
2013	Bronx Academy for Software Engineering	Software Engineering	Bronx
2011	Bronx Design and Construction Academy	Carpenter; Electrician; HVAC; Plumbing Technology; Pre-Engineering/ Architectural Drafting	Bronx
2009	Business of Sport School	Entrepreneurship and Business Management	Manhattan
2014	Business Technology Early College High School	Computer Science and Technology	Queens
2009	City Polytechnic High School of Engineering, Architecture, and Technology	Pre-Engineering	Brooklyn
2011	Crotona International High School	Computer Software and Media Applications, Other	Bronx
2013	Energy Tech High School	Energy Technology	Queens
2013	Health, Education, and Research Occupations High School	Health, Education, and Research Occupations	Bronx
2012	High School for Energy and Technology	Facilities Management / HVAC	Bronx
2013	Institute for Health Professions at Cambria Heights	Health Professions	Queens
2014	Inwood Early College for Health and Information Technologies	Computer Science and Technology	Manhattan
2014	Manhattan Early College School for Advertising	Multimedia Arts, Multimedia Programming, or Business	Manhattan
2010	Pathways in Technology Early College High School	Computer Science; Engineering; Entrepreneurship/ Virtual Enterprise	Brooklyn
2009	Quest to Learn	Bioinformatic Systems; Game Systems Design, Visual Systems; Visual Communications	Manhattan
2012	School for Tourism and Hospitality	Academy of Hospitality	Bronx
2013	Stephen T. Mather Building Arts & Craftsmanship High School	Building Arts and Historic Preservation	Manhattan
2012	Union Square Academy for Health Sciences	Dental Assistant / Pharmacy	Manhattan
2011	Urban Assembly Gateway School for Technology	Digital Design and Animation; A+ Computer Repair; Software Engineering Pilot	Manhattan
2014	Urban Assembly Maker Academy	Computer Science and Technology	Manhattan
2013	Urban Assembly School for Emergency Management	Emergency Management	Manhattan
2013	Urban Assembly School for Global Commerce	Global Commerce	Manhattan
2009	Urban Assembly School for Green Careers	Environmental Technology; Environmental Technology/Horticulture	Manhattan

Source: New York City Department of Education

### III. Schools, Students, Outcomes

#### Three Kinds of CTE Programs

Two types of high schools in New York offer student access to CTE course work: traditional comprehensive high schools and CTE-dedicated schools. Both are designed to ensure that graduating students are eligible to go on to college. The primary distinction between the two: traditional comprehensive high schools offer CTE courses as electives, and some students in the school take no CTE classes, while CTE-dedicated schools tend to offer more CTE options, and all students take CTE courses. Within CTE-dedicated schools there is a further distinction between traditional 9–12 high schools and—a third type of program—those that offer CTE course work across grades 9–14. In the 2015–16 school year, 42 9–12 CTE-dedicated schools, seven 9–14 schools, and an additional 74 comprehensive schools offer CTE course work.<sup>10</sup>

All New York CTE programs organize courses into “programs of study”—sequences of courses related to a single theme. For instance, several courses—accounting basics, accounting ethics, and accounting for a payroll system—might make up a program of study designated as accounting. New York schools offer several dozen programs of study, which are further organized into 16 nationally designated “industry clusters.”<sup>11</sup> Accounting, for example, falls under the industry cluster “business, management, and administrative services.” The classifications of instructional program in the NYC data (Figure 2) correspond roughly to the 16 nationally defined industry clusters.

**NYC Instructional Programs**

**FIGURE 2.**

Classification of Instructional Program	Number	Share
Business, Management, and Related Services	46	17.0
Computer and Information Sciences	36	13.3
Engineering Technologies	33	12.2
Health Professions and Related Programs	31	11.4
Law Enforcement, Security, and Firefighting	29	10.7
Visual and Performing Arts	27	10.0
Mechanic and Repair Technologies	21	7.7
Personal and Culinary Services	13	4.8
Communication Technologies	11	4.0
Construction Trades	11	4.0
Communication, Journalism, and Related Programs	7	2.5
Transportation and Materials Moving	2	0.7
Family and Consumer Sciences / Human Services	1	0.4
Multi/Interdisciplinary Studies	1	0.4
Public Administration and Social Services	1	0.4
<b>Total</b>	<b>270</b>	<b>100%</b>

Source: Authors' calculations based on data from the New York City Department of Education

Students at comprehensive high schools are offered CTE course work in a handful of programs of study. The number of programs offered may be as few as one or as many as nine; the average comprehensive school with CTE course work offers two programs of study. CTE-dedicated schools focus more intensively on a single CTE theme and, typically, on one or several career pathways. For instance, Energy Tech High School focuses on electricity, engineering, and technology and has partnerships with Con Edison and National Grid. Dedicated CTE schools offer one to 11 programs of study, with the norm being three or four.

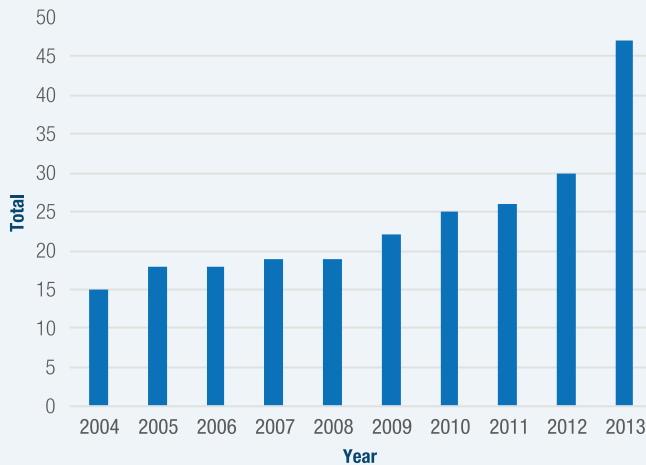
All New York CTE programs—stand-alone CTE schools and CTE programs housed in comprehensive schools—integrate academic and technical course work. The 9–14 schools go further in coordinating between the high school and a designated community college to ensure that students complete an associate’s degree while in high school.

The number of schools offering CTE programming has increased substantially over the last decade. The New York small-schools-of-choice program increased the number of schools serving high school-aged students from about 200

in 2004 to more than 400 in 2015. The number of schools that offer CTE course work in any setting went from about 70 to 121 during this period.<sup>12</sup> The number of CTE-dedicated schools more than tripled, from 15 in 2004 to 47 in 2015 (Figure 3).

FIGURE 3.

### CTE-Dedicated Schools by Year, NYC, 2004–13



Source: Authors' calculations based on data from the New York City Department of Education

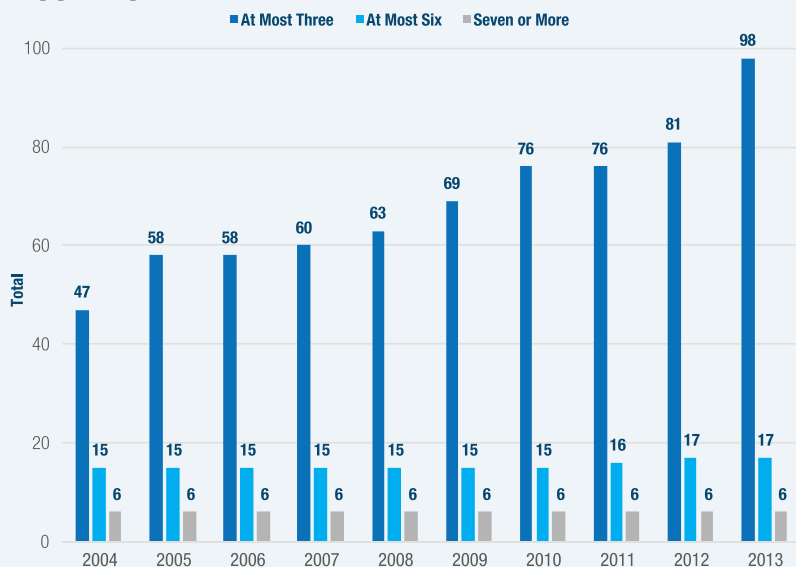
While the number of schools offering CTE course work has expanded over time, the average number of programs offered at schools with CTE courses has remained relatively stable (Figure 4). The average number of programs offered at a single school has held steady at between one and three, despite the growing number of schools with CTE programs. This may be explained by the fact that new schools are able to establish only one or two programs initially, and then expand them over time. Alternatively, it may be that schools dedicated to a single theme—health services or finance, for example—prefer to maintain their focus rather than offer additional programs of study. Only two schools have increased the number of program offerings into the four-to-six program range in recent years.

#### The Admissions Process

In the early 2000s, the New York City Department of Education reformed the high school admissions process, introducing a centralized matching system that allows incoming ninth-graders to select from more than 400 high school options.<sup>13</sup> All New York CTE programs participate in this process, and all admit students on a random basis—admissions are not test-based.

FIGURE 4.

### Number of Schools Offering CTE Programs, NYC, 2004–13



Source: Authors' calculations based on data from the New York City Department of Education

There are requirements to qualify for the lottery at some schools: most CTE schools ask that students attend at least one information session to demonstrate their interest, before applying formally. About 25 percent of schools ensure that students represent a cross-section of ability, as measured by previous reading-test scores. About 10 percent of schools that offer CTE give preference to applicants based on demonstrated academic performance and behavior (attendance and punctuality) in the prior year; but only three of the schools that screen applicants are CTE-dedicated schools.

At the end of seventh grade, students are given a high school directory designed to help them identify the best schools for them. Workshops, guidance counselor support, and high school fairs are available from September to late October to assist students and families with the process of choosing. All choices must be submitted by December. Students may indicate a preference for up to 12 schools, not including specialized high schools like Bronx High School of Science or

Stuyvesant High School. Initial offers of admission are sent by early March of the eighth-grade school year. Students who chose ten to 12 schools are matched to one of their choices 97 percent of the time. If students are not matched with a school through two rounds of school review, they are assigned to one that has open seats.

### **Courses Aligned with the Twenty-First-Century Economy**

Many people think that CTE focuses on preparation for employment in the skilled trades. In fact, most CTE course offerings in New York City reflect the larger regional economy, with a focus on high-growth sectors like information technology and health services. Business, management, and related services account for the greatest number and share of programs of study offered, followed closely by computer and information services, engineering technologies, and health professions—all closely aligned with current labor-market needs.<sup>14</sup>

In 2015, there were 97 programs of study offered across all New York schools, with 67 programs of study offered in CTE-themed schools and roughly 57 (obviously with some overlap) in non-themed schools.<sup>15</sup> The programs of study span traditional trades (there are two each in carpentry, plumbing, and four electrician programs) as well as high-growth areas, such as information technology (six programs citywide), computer programming (eight schools), and nursing (five schools).

### **Who Enrolls and How They Perform**

Students in CTE programs appear to outperform peers on several important metrics, including high school graduation rates and daily attendance. Available data are limited, and there is much that we don't know. The city's randomized system for assigning students makes it difficult to compare outcomes across school settings. We also don't know whether college enrollment and employment outcomes are better for CTE students. Still, the data reveal significant descriptive differences. And the randomized admissions process alleviates concern that more favorable outcomes at CTE schools are driven by differences in the students who enroll in these programs.

Students enrolled in CTE programs are largely representative of the New York student population in racial and ethnic composition, with a few notable differences (**Figure 5**). The student population in comprehensive high schools that offer no CTE is over 80 percent black and Latino; the same proportion holds at CTE-dedicated schools. But at comprehensive schools with CTE offerings, the number falls to 73 percent. This underrepresentation of students of color comports with the disproportionately higher levels (13 percent) of white students in CTE programs in comprehensive schools, compared with their presence outside CTE of only 7 percent.<sup>16</sup>

**Means and Standard Deviations of Variables by School Type, NYC, 2013**

**FIGURE 5.**

Variable	Comprehensive Schools with CTE programs	CTE-Dedicated Schools	Schools Offering No CTE
Ethnicity			
White	0.13	0.05	0.07
African-American	0.32	0.41	0.39
Latino	0.41	0.47	0.44
Asian	0.13	0.07	0.09
Female	0.49	0.38	0.51
Students with Disabilities	0.10	0.13	0.11
Graduate in 4 years (%)	0.69	0.72	0.69
Graduate in 6 years (%)	0.78	0.78	0.78
Class Size	15.42	14.60	17.27
Attendance Rate	86.93	87.23	84.52
ELA Proficiency	27.62	—	23.91
Math Proficiency	23.81	—	22.56

Source: Authors' calculations based on data from the New York City Department of Education

Also noteworthy, and consistent with national data, is that fewer female students are enrolled in schools that offer CTE: only 38 percent of students in CTE-dedicated schools are female, compared with roughly half the student population outside CTE. As is the case nationally, students with disabilities are represented at a higher rate in CTE-dedicated schools.<sup>17</sup>

We find evidence that disproportionalities of white students in CTE may persist but in a more muted fashion. Specifically, in 2004, 20 percent of students who enrolled in comprehensive schools with CTE programs identified as white; in 2013, only 13 percent did.<sup>18</sup> This change has brought the composition of these schools more into line with the overall student-age population of the city and likely reflects a democratization of access brought about by the newer admissions process.

CTE-dedicated schools have smaller classes, on average. Classes are about three students smaller (or about 15 percent smaller) in CTE-dedicated schools, compared with schools not offering CTE. Classes at comprehensive schools with CTE offerings are about 10 percent smaller than at schools that offer no CTE, a fact that may be a legacy of the small-schools movement or may be a distinctive feature of CTE.

Attendance and graduation rates are better at all three types of CTE programs: those housed in comprehensive schools, dedicated 9–12 CTE high schools, and 9–14 schools.<sup>19</sup> Attendance rates are less variable and 3–5 percentage points higher in schools offering CTE programming, and even higher at CTE-dedicated schools. The six-year graduation rate is similar across all three school types; the share of students who graduate in four years is highest at CTE-dedicated schools.<sup>20</sup> (While graduating in six years is certainly more valuable than not graduating, higher four-year completion rates mean earlier access to college and earlier entry into the labor force, both of which confer economic benefits.)

Differences in test scores are harder to discern because scores have not been systematically available in New York in recent years. There is, however, some evidence that students in comprehensive schools with CTE programs score better than students at comprehensive schools with no CTE offerings: a larger share of those in schools with CTE classes score at, or above, proficient in English and math tests.<sup>21</sup>

It's hard to know what explains the better attendance and graduation rates at CTE schools. The average CTE student may be more motivated than his peers. The smaller class size at CTE-dedicated schools could contribute to better outcomes. Or there may be a factor that has nothing to do with CTE. But the better outcomes that we find in New York are consistent with emerging evidence suggesting that CTE may improve student engagement. We speculate that smaller classes, the focus on a single theme or occupation, and the way CTE programs connect student learning to the world of work all enhance the student experience and ultimately lead to better outcomes.

## IV. Implementing the Essentials

CTE reformers in New York and beyond are in broad agreement on the essentials of a good program:

1. Programs must prepare students for college and careers, allowing young people to keep their options open.
2. There can be no meaningful career training without a deep engagement with business and industry.
3. The passage from secondary to postsecondary education or training is perilous for many teens and requires special attention from educators.
4. What happens in the classroom is not enough: students need exposure to the workplace and work experience.
5. Educators know a lot about assessing academic excellence, less about determining career readiness, and among the best tools at their disposal are industry-recognized occupational credentials.

The New York CTE movement embraced these five tenets early on. All were present in the Bloomberg task force's foundational 2008 report. All made their way into the thinking at the city Department of Education. And all are now enshrined in city or state regulations, informing what is required for state CTE program approval and part of the implicit charter that every New York City CTE program aims to fulfill (**Figure 6**).<sup>22</sup>



## New York State CTE Program-Approval Requirements\*

FIGURE 6.

Curriculum and Instruction
<ul style="list-style-type: none"><li><input type="checkbox"/> Program has a coherent sequence of courses that link academic knowledge with technical skills.</li><li><input type="checkbox"/> Curriculum is aligned with Common Core Learning Standards and industry-based competency standards.</li><li><input type="checkbox"/> Courses are taught by state-certified teachers with industry experience. The school must also have one CTE teacher certified as a work-based learning coordinator.</li></ul>
Work-Based Learning
<ul style="list-style-type: none"><li><input type="checkbox"/> The program has a sequence of grade-appropriate work-based learning experiences (career exploratory activities, mentorship, and industry-based career related competitions) that culminate in opportunities for internships.</li></ul>
Assessment and Accountability
<ul style="list-style-type: none"><li><input type="checkbox"/> The program uses a technical assessment that is nationally recognized and approved by the relevant industry and the New York State Education Department.</li><li><input type="checkbox"/> An advisory team made up of business/industry and postsecondary partners works with the school to ensure that the program is aligned with industry standards.</li></ul>
Partnerships
<ul style="list-style-type: none"><li><input type="checkbox"/> There is an articulation agreement with a two- or four-year postsecondary institution, enabling students to earn college credit, tuition waiver, or advanced standing leading to a credential, apprenticeship, associate's or baccalaureate degree.</li><li><input type="checkbox"/> Where applicable, there is an articulation agreement with a business/industry partner that provides postsecondary training, apprenticeship, and/or employment opportunities for students who successfully complete the program.</li></ul>
Program and School Capacity
<ul style="list-style-type: none"><li><input type="checkbox"/> School provides professional development for teachers to stay current with emerging trends in industry and instructional practices.</li></ul>

\*Nine of 26 "quality indicators" taken into account by the New York State Education Department in considering approval for CTE high schools  
Source: New York State Education Department

Still, as New York educators have learned from experience, each of these tenets takes years to achieve, requiring constant work and attention. Educators on the ground need help from the city and state. And nearly ten years into the CTE revolution in New York, all the basics remain difficult, elusive for many schools and out of reach for others—a day-to-day challenge for educators and administrators. New York's efforts to grapple with these difficulties are what make the city's CTE schools a laboratory for the nation. The following sections trace how New York CTE educators are implementing the five tenets—the successes and the areas where more work is needed.

### **College and Careers**

As with many of the tenets of effective CTE, it's easy to assert that every program will prepare young people for college and careers. What's difficult is *how*—operationalizing the principle. Most high schools, in the U.S. and elsewhere, have a hard enough time getting students ready for college: it takes all day, five days a week, for several years. Yet CTE schools are expected to add a second mission and succeed at both.

Visit any CTE school in New York, and the difficulty is readily apparent. Virtually no program seems to have enough time for everything it wants to accomplish. The challenge starts with the state's stiff academic requirements. In contrast with many other states, where graduating from high school depends on seat time and course credits, no New Yorker receives a diploma without passing state-approved standardized Regents exams. The exact requirements have changed somewhat over the years, including the 2015 reform allowing CTE students to opt out of one exam by passing an occupational assessment.<sup>23</sup> But the challenge remains: to graduate, all but a tiny handful of teenagers must pass at least four Regents: English, math, science, and social studies. There's a cutoff score—65 percent or better—and no school takes the tests lightly. The difficulty for a CTE program: packing enough periods into the day so that every student completes 22 course credits, prepares adequately for at least four Regents, learns a technical skill, and spends time on the job, learning in the workplace.

Bottom line, unlike the old vocational education, CTE isn't easier than a traditional academic high school education. It's harder, for schools and for students.

Different schools across New York struggle in different ways to meet the challenge. Every program works to integrate vocational content into academic course offerings—that, too, is required by the state. Many add time to the school day or to the school year or to the number of years it takes to complete high school. At some programs, the burden seems almost too heavy. Asked about how they divide the day, many educators estimate 70-30—70 percent academic work to 30 percent CTE. But it sometimes seems as if the state's Regents requirements are crowding out technical training, particularly work experience—routinely neglected or put off until summer or cut back to the point that it becomes perfunctory. Other schools manage the balance better and say their students rise to the occasion.

What's striking is that virtually no New York teachers or administrators seem to want to change the state's demanding double-barreled requirements. This is the essence of the new

CTE, and educators see it as their job to make it work, not just by fitting in both kinds of learning but, even more importantly, integrating academic and technical curricula. Ask virtually any student or teacher what makes CTE special, and they offer a version of the same answer: what one Brooklyn tenth-grader described as “learning by doing.” A teacher explained: “Kids want to know why they're learning what they're learning—what's the point and how they'll use it. We combine what they learn in the classroom with real-life experience, and that changes everything—their motivation, how hard they work, and, usually, how well they do.”

But integrating academic work and technical training is not easy, and results vary widely across the New York system. The state education department requires all CTE programs to submit a combined curriculum.<sup>24</sup> The team launching a new CTE school spends several months before it opens mapping out courses and developing lesson plans. The best programs recruit business and industry, postsecondary partners and independent subject-matter experts to help with the process—a painstaking, intentional effort. Other schools leave it to individual teachers to coordinate as the year unfolds, and it's often a daunting task. CTE instructors and traditional teachers come from different cultures; they speak different languages; they don't have enough time. And according to a 2015 survey conducted by PwC for the Partnership for New York City, a majority of New York CTE principals believe that academic work and technical training could be better integrated at their schools.<sup>25</sup>

The combined curriculum is different at every New York CTE school, and some curricula seem more meaningful than others. One program that prepares young people for maritime careers incorporates sea chanteys into its music syllabus. A school with a business focus uses math class to teach students about global economic indicators. A pre-engineering program works technical writing into English language arts. Still, educators at virtually every CTE school emphasize that they aim to produce “well-rounded students,” and most feel that despite the payoff to a combined curriculum, integration should go only so far—no school wants to cut off options for its graduates.

### **Industry Engagement**

A second critical pillar of CTE and, if anything, one that's harder than integrating academic work with technical training, is engaging partners from business and industry—local employers who know firsthand about what skills are needed in the workplace. There's no substitute for employer engagement, and it's not a one-time or occasional thing. What's needed is a real-time, sustained, day-to-day relationship,

where the employer has input into every aspect of what happens in the school: what it teaches, how it teaches, what technical equipment it uses, and what standards it holds out for students. The problem: educators and employers approach collaboration very differently. Their values, their timeframes, the way they go about business could not be more different in most cases. And most have little experience working across this cultural divide.

Educators, employers, city, and state authorities: everyone involved in the New York CTE movement grasps the importance of employer engagement. There's no question about what's needed and no dispute about what it looks like when it works. But no one in the city—neither employers nor educators—thinks that the system is meeting the challenge adequately.

Seen one way, New York City is a paragon of employer engagement, blessed with a handful of large, high-profile companies that saw the promise of CTE early on and invested heavily. IBM was in the vanguard, bringing CUNY and the city Department of Education together in 2010 to drive the development of the first six-year CTE early-college high school, a highly promising model that has now taken off in New York State and beyond.<sup>26</sup> IBM helped develop the curriculum for P-TECH. The company pays a full-time staff person to coordinate with the school. Every summer, IBM sponsors 60–70 paid student interns. IBM executives are among the nation's most vocal and persuasive advocates for the new CTE. New York's giant energy utility, Con Edison, has also stepped up to cosponsor a six-year high school and engage day to day to guarantee its success.<sup>27</sup> And many smaller firms around the city are doing their part to advance the CTE movement.<sup>28</sup>

The problem starts with the number of companies engaging. The Partnership for New York City estimates that the city is home to roughly 20,000 companies with 20 or more employees. But according to the 2015 PNYC/PwC survey, just 733 employers of any kind currently partner with New York CTE schools—and more than half of them are government agencies or nonprofit organizations, not companies. With some 120,000 New York high school students studying CTE and 26,000 attending dedicated CTE high schools, just 1,575 found internships with employers in 2014—and less than half of those were in the private sector.<sup>29</sup>

The companies that engage vary widely, from one of the city's largest hospitals to boutique architecture and engineering firms and, occasionally, neighborhood mom-and-pop restaurants or contractors. The problem: by all accounts, most are driven by a sense of corporate social responsibility,

not a practical interest in training and hiring workers. According to the PNYC/PwC survey, most do not generally hire high school graduates or even associate's degree holders; the overwhelming majority require a bachelor's degree or higher. And in most cases, this limits their engagement: it's about charity, not company need or interest.

The state education department requires approved CTE programs to have industry partners and encourages each school to form a business-advisory council. But this is just a first step. As one teacher explained, "Every school has a partner, or several partners. That's not the problem. The question is the quality of those partnerships—the level of engagement."

In the best, most fully realized, partnerships, employer and educator sit down together long before the school opens to analyze the employer's workforce needs and design a program that will prepare students for available jobs. Educators who have been involved in these conversations describe an intensive, engaged process, where they work to understand everything from the company's hierarchy to its corporate culture and plan backward from there to map out what happens in the school.

The collaboration continues when classes begin, and there are countless ways for a company to engage. The most valuable is to hire interns, giving students an opportunity to spend time at the company, exploring the world of work and learning on the job. Also popular and, according to teachers, highly meaningful to many students, is mentoring: company staff put in time at the school month to month, or even week to week.

Still other possibilities include sending guest speakers to the school, hosting students at the company for job shadowing, sponsoring field trips, funding professional development for teachers, and financial contributions, often for scholarships. Engaged companies consult regularly with school administration, formally and informally throughout the year, providing input, for example on how the workplace is changing—the technology the company is using and its evolving workforce needs. The last, all-important step: giving graduates a first crack at a job. It's rarely a guarantee, but a number of New York companies promise at least an interview.

The problem is that for every New York school that comes close to this ideal, there are dozens that fall short. Maintaining a partnership takes time and effort on both sides. What's needed starts with imagination—the creativity to envision a kind of relationship that neither partner has been part of in the past. But there's also the day-to-day routine, from finger-

printing mentors—required by the city—to purchasing MetroCards for students so they can travel back and forth between the school and the company.

Educators who have made it work talk about “cultivating” their industry partner and “managing” the relationship. In many cases, it’s a slow, gradual process; you start with a guest speaker and work up from there, often over several years, to a couple of internships. In other cases, it’s the company that is eager to move ahead and can’t understand why it’s so hard to engage the school or the school system. According to the PNYC/PwC survey, 55 percent of private companies and 61 percent of nonprofits complained about school bureaucracy and slow response times.

This problem isn’t unique to New York; career educators everywhere struggle to find industry partners and engage them in meaningful ways. But the New York CTE movement will not succeed unless it finds a way to dramatically expand employer involvement.

Among the remedies under discussion among employers and educators: more funding and freed-up time for in-school staff who coordinate with industry partners; more funding and dedicated staff at the Department of Education; and better tracking of employer engagement and student outcomes so that companies know what they’re getting into when they choose to work with a school. Still another proposed solution is funding for a tier of go-between organizations: nonprofit intermediaries that can broker marriages between schools and companies and manage the relationships, from the fingerprinting to the MetroCards and more.

But arguably most important in the long run will be engaging a different kind of company, driven less by corporate social responsibility and more by the corporation’s self-interest. The relationship needs to start with an understanding of what the firm and its industry stand to gain from creating a pipeline for trained workers—that is the only motive for companies to engage over the long haul on the scale that’s needed and with the intensity it takes to make it work.

### ***The Bridge Between Secondary and Postsecondary Education***

Parents and educators the world around know all too well that few periods are more dangerous for teenagers than the days between high school and whatever comes next. It’s so easy for even motivated, accomplished young people to stumble as they come to the end of one well-marked path and embark—or not embark—on another.

CUNY had been experimenting with early-college high school—early-college *academic* high schools—for several years when IBM approached the system in 2010 and suggested trying it with CTE students. The concept was not new: several highly regarded European career-education models, including apprenticeship, combine secondary and postsecondary training into a single program. And the idea of helping students bridge the gap has become a core pillar of the new CTE. But New York has taken the concept further than many other school systems.

IBM’s P-TECH and other similar schools build on a three-party agreement: high school, company, and postsecondary institution as equal planning partners. Students take college courses for free while in high school, sometimes at the high school, sometimes on the college campus. And when they graduate at the end of six years, they receive high school diplomas and associate’s degrees. This seamless design and focus on a college credential make P-TECH the Cadillac of secondary-postsecondary bridges. But it’s not alone among New York CTE schools in engaging city colleges.

State regulations require approved CTE programs to recruit postsecondary partners and sign articulation agreements, coordinating curricula across institutions and allowing students to transfer credit from one school to another.<sup>30</sup> The promise in New York, according to a nonprofit at the forefront of the new CTE movement, is to provide early-college opportunities for all CTE students. The emphasis on articulation agreements isn’t unusual; several other states encourage them in the CTE context. But New York is the only state to require them at all CTE high schools.

Articulation agreements are increasingly popular across the U.S.: between secondary and postsecondary schools, between two-year and four-year colleges, for academically minded matriculants, and for CTE students. But they’re often notoriously difficult to implement. Many colleges resist them, often by declining to accept transfer credits or by forcing students to negotiate course by course. And when they can’t simply say no, many institutions bury would-be transfers in paperwork. New York has circumvented all this with a combination of the state requirement and generous funding from the Gates Foundation, among others—a significant achievement.

When it works, as it does at many New York CTE programs, a bridge between high school and college is invaluable for students. There are few better predictors of college success than doing college work while in high school.<sup>31</sup> Some New York students start as early as tenth grade, taking special hybrid courses offered in a high school classroom but taught by

college professors or informed by consultation with a college partner. By 11th grade, many go to class on campus, mingled in with college students, paying nothing for coveted credits that would cost them dearly later on, once they have enrolled in college.

High schools help with prep sessions on what to expect on campus. Students are taught how to read a syllabus, how to use a college library, and how college professors are different from high school teachers, expecting students, for example, to get their assignments done without prompting. Bottom line: it's a chance to taste the independence of college but with all the structure and support that helps young people get through high school. Then, once they graduate, New York CTE students face a relatively unobstructed path to a much quicker and easier CUNY associate's degree, if not a more ambitious award.

The challenges for a CTE school are much the same as those posed by employer partnerships. Most New York high schools find it easier to form a college partnership than an employer partnership. There's less of a culture gap between two educators than between an educator and an employer. CUNY has a stake in ensuring that its affiliated institutions engage. And every New York CTE program has a relationship with a college. But in this case, too, agreeing to collaborate is just the beginning. Even the best relationships require more upkeep than anyone anticipated, and few schools have adequate resources.

CTE school officials responsible for coordinating with postsecondary partners often complain that they bear the burden of managing the relationship. They say that high school students get lost on college campuses or are treated like second-class citizens. Communication can be difficult: "Everything is a huge conversation," complained an exasperated college liaison at one high school. And as with industry partnerships, busy teachers are overwhelmed by what it takes to make the relationship a success, including time spent on chores like buying MetroCards and wrestling with paperwork.

In this as in all things, there's great variety across the city's 270-plus CTE programs. Some New York high schools hardly seem to know that they have a college partner: they're so busy with the challenges of getting kids through high school that the administrator responsible for the collaboration hasn't even visited the campus. But even the schools with the most successful relationships say that these are early days and there are many things still to work out. Administrators at one highly regarded early-college high school put it bluntly: "Now that we know the college and we've been doing this for a few

years, we'd like to renegotiate the agreement." They also want more funding, more staff, and fewer restrictions on how they deploy staff.

### **Work-Based Learning**

The pinnacle of the CTE experience—what makes it different from a traditional academic education—is work-based learning. It's an ideal borrowed from Europe: the model is German or Swiss apprenticeship, where high school students spend half the week in the classroom and the other half on the job, learning by doing. It's not just exposure to the world of work in Europe; it's actual work—with workers' hours, adult responsibilities, performance pressures, a boss, and a paycheck.

Few U.S. high school CTE programs come close to the European ideal. No one expects high schools to organize full-fledged apprenticeships. But in New York, as elsewhere, CTE educators are committed to the concept of work-based learning. State regulations require that approved CTE programs have a "sequence of grade-appropriate work-based learning experiences."<sup>32</sup> Every school maintains a state-certified "work-based learning coordinator." Everyone allied with the system agrees, as the nonprofit school-support group Urban Assembly puts it: work-based learning is a "cornerstone of effective CTE."<sup>33</sup>

It's a lofty goal, difficult to achieve, and the biggest challenge still facing the New York CTE movement.

Every school makes an effort. State regulations make it easier by defining work-based learning as what many educators call a "spectrum" of experiences. Among the possible stops along the spectrum: a guest lecture by someone from a company, a walk-through at a firm, job shadowing, field trips, and mentoring. The culminating experience is internship, meant to approximate the European ideal, albeit shorter—usually a month or two in the summer, sometimes drawn out over a semester.

In theory, this sequencing makes sense. Few ninth-graders are ready for a full-fledged internship, and educators often find that their industry partners respond best to a series of graduated requests. "Start small," one assistant principal urged, "and work up to a job placement." But troublingly few schools or students work through the sequence to the payoff at the end.

There's no authoritative count of how many New York CTE students complete internships. The PNYC/PwC survey doesn't claim to be definitive—questions were posted online and respondents self-selected—but the findings are alarming. If indeed only 1,575 students had placements in 2014, that's less than 2 percent of all CTE students and less than 5

percent of seniors. According to the survey, even at dedicated CTE schools, fewer than 10 percent of seniors went to work outside the school in 2014.

Work-based coordinators at many schools report better outcomes: at the programs we visited, figures ranged from 50 percent to 60 percent of students. The city Department of Education says that it has no reliable data and points out that the number of summer placements grew dramatically in 2015, from 400 to 800. PwC cites “self-reported school numbers” supplied by the department, suggesting that 4,604 students had paid or unpaid internships in 2014. But even that would be a distressingly low share—just 15 percent of New York CTE students in their senior year.

New York educators defend the concept of a spectrum of activities, and many students appear to agree. Mentorships are clearly popular. Job shadowing at a company can be eye-opening for a young person. Teachers report how much it means to students when a team from a partnering firm visits the school to listen to student presentations. “For many young people who don’t get much attention at home,” one principal explained, “it’s a life-changing experience to be exposed to so many adults. It’s the most important thing we provide.”

Other CTE reformers who endorse the New York model make a plausible distinction between two components of work-based learning: “career exploration”—guest speakers, field trips, job shadowing, and career fairs—and actual “work experience.” And clearly, both are valuable. But in the end, they’re not the same. Work pressures, work responsibilities, the experience of holding up your end on a working team—that doesn’t happen anywhere but on the job. And for a young person, there’s no substitute for the satisfaction of coming through this trial by fire successfully.

School work-based learning coordinators have a difficult job. It’s no small thing for a company to bring high school students into the workplace and supervise them for several months. Even the most sympathetic industry partners are often reluctant. The PNYC/PwC survey finds that the overwhelming majority of employers who have hosted interns are prepared to do so again. And a relatively modest number—25 percent—complain that students don’t have the requisite hard or soft skills.

Still, more than half of CTE schools report a gap between the supply of available internships and the demand at school. Even when they succeed in lining up placements, educators report that quality varies; the job isn’t always aligned with what students are learning in class. In some schools, there are also issues on the demand side: students are so busy with school-

work that they feel burdened when asked to add additional responsibilities, especially if it means unpaid working hours. (The city subsidizes some 1,200 internships a year, with some employers, particularly nonprofits, picking up all, or part of, the bill. But according to the PNYC/PwC survey, some 40 percent of New York high school internships are unpaid.)

Coordinators who succeed in placing interns tell much the same story as school officials charged with lining up partnerships with companies and colleges: it’s up to the high school to manage the relationship, and it takes a lot of work. Outreach is only the beginning. It’s about cultivating the would-be employer, helping the company understand what it means to offer an internship, working with it to structure the experience, and managing the expectations of students and employers. Among New York firms that partner with CTE schools, a handful assign someone from the company, an “industry liaison,” to help manage the relationship. But these companies are the exception; in the overwhelming majority of cases, schools bear the burden.

Opinions differ on whether the school—or even the school working in tandem with city education officials—can do this work unaided. Some CTE reformers think that the only way to make internships available on the scale that’s needed is to fund a tier of nonprofit intermediaries to manage relationships between schools and companies, and some New York CTE schools rely heavily on go-between groups like Futures and Options, Scholars at Work, or the Careers through Culinary Arts Program. But other educators, often at newer CTE schools, maintain that they can do the job. What’s needed, they say, is additional funding. As is, their work-based learning coordinator doesn’t have time; he teaches a full load of classes. And even a full-time person isn’t likely to be enough, educators say—this is a job that takes a team.

It’s hard to know which view is right—perhaps both are correct. Either way, there is clearly much to be done. Coordinating meaningful work-based learning, including internships, is the biggest hurdle facing the New York CTE system and arguably the most important thing to get right.

### ***Industry-Recognized Credentials***

New York state education authorities affirmed their commitment to CTE in no uncertain terms in April 2015, enacting the reform known informally as “4+1” that allows CTE students to substitute a technical occupational assessment for one of five required Regents exams.<sup>34</sup> The Partnership for New York City came out strongly in favor of the change. So did the NYSUT, a federation of 1,200 labor unions representing 600,000 school employees across the state. For CTE educators, the measure

was a long-sought declaration of parity, giving traditionally disparaged technical skills what one advocate proudly called the same “status” as hallowed academic learning.

But like several key elements of CTE in New York, the 4+1 option remains a tantalizing promise yet to be fully realized. The new rule codifies the concept of accepting technical assessments. Still to be established by the state is a meaningful, up-to-date roster of approved industry tests.

Occupational certifications, also known as “industry-recognized credentials,” are a relatively new tool, pioneered in recent decades by a handful of national employer associations.<sup>35</sup> For a student, the process starts with a competency-based test, usually with hands-on and written components, measuring skills in demand in the workplace. Unlike with a degree, employers don’t care where the trainee learned the skills being measured—it can be at school, in the workplace, or studying at home on the Internet. If the assessment is a true test of ability and has proved its value to companies across an industry, it can be a ticket to a job—a guarantee that the student has what it takes to succeed in the sector.

Such credentials exist in several industries: established standards trusted by a preponderance of employers. Millions of IT technicians around the world are hired on the basis of certifications rather than academic degrees. Many construction contractors and automotive technicians rely on skills tests promulgated by their national industry associations or affiliated groups. But employers and educators excited about the new credentialing admit that the field is still evolving. Of the 4,000 occupational certifications available in the U.S. today, only 10 percent have been validated by a third party.<sup>36</sup> There is no national accrediting body or registry. And many credentials are hardly worth the paper they’re written on. The skills they measure are outmoded or useful only at a few firms, or worse.

In the face of this confusion and uncertainty, New York, like many states, has tried to set its own standards, creating a list of approved credentials that high school students can earn to qualify for a CTE diploma. But erring on the side of caution, state authorities have approved only 14 credentials, many of them not particularly valued by employers and rarely used to make decisions about hiring.

The consequences couldn’t be worse for students. Many set their sights on a credential and study hard to pass the test—only to find once they graduate that the credential is useless in the marketplace. Meanwhile, CTE educators and employers are frustrated because the state has not approved credentials in their fields. There is no credential yet—or no good fit, according

to Albany—in advanced manufacturing, mechatronics, or aquaculture, to name just a few emerging sectors. Bottom line, many CTE programs across the city feel that they are holding out a false promise, teaching students a trade for which there is no approved assessment.

A second, similar bottleneck—a second often-heard complaint about decision making in Albany—is CTE teacher certification. Teachers who aren’t certified are sharply limited in the duties that they can perform and sometimes are unable to do their jobs. Yet many instructors across the city have waited months or even years for certification because the state education department doesn’t recognize their area of expertise—hasn’t approved their cutting-edge industry or technical skill. Few educators quarrel with the idea of state oversight. But a growing consensus holds that the standards being applied in Albany are out of sync with reality in the workplace, starting with the pace of change that is driving the twenty-first-century economy.

The problem starts with industry credentials and teacher certification and balloons to CTE program approval—the formal state recognition required for full CTE funding from Albany and Washington. Among the key criteria for approval: industry-aligned integrated curricula, an industry partner, a post-secondary partner, work-based learning opportunities, a relevant technical assessment approved by the state, and certified CTE teachers. It’s an excellent list, a faithful inventory of the essential elements of the new CTE. But educators and employers across the city criticize the way it’s being implemented in Albany. The top complaints: that state standards are inflexible; they’re not up to date; they don’t measure the right things; and they don’t incentivize the right things—mostly because state standards don’t reflect innovative, emerging technical fields.

Lack of state approval comes with a cost: not just funding but also the right to issue CTE-endorsed diplomas. Still, according to teachers and administrators across the system, a growing number of schools are deciding that it’s not worth the trouble to apply—they can function without the imprimatur.

The New York education establishment has committed to a bold course, embracing the new CTE on an impressive scale. But important as the last decade’s city and state decisions have been, they are only the foundations of a system still under construction. Changes are needed in Albany to restore the legitimacy of state standards and regain authority with educators and employers. But the work ahead doesn’t end there. As the certification impasse shows, the innovation that matters most is what’s happening in CTE schools. The challenge for the system is to find ways to keep up with it and enable continued growth.

## V. Policy Recommendations

Entering its second decade, a much trumpeted success story, the new CTE movement in New York is still struggling to translate its cutting-edge vision into sustainable day-to-day practice.

Like CTE educators everywhere, New York principals and teachers labor to build working relationships with employers, combine academic learning with technical training, and craft reliable bridges for students moving from secondary to post-secondary education. And now as the system matures, a new challenge is emerging: establishing the proper relationship between policymakers, at city and state levels, and the innovation taking place in the schools.

The history of CTE in New York illustrates what can be accomplished when that relationship is in balance, as well as what happens when it falls out of kilter. The New York CTE revolution began outside the classroom with new thinking and innovative leadership, including by Mayor Bloomberg, his 2008 CTE task force, CUNY, and a handful of executives at IBM corporate headquarters. The first critical breakthroughs were conceptual; good ideas spread from offices in Manhattan out to the boroughs and into some 150 different schools, each of which interpreted the new directives in its own way and experimented as circumstances permitted. But then, as time went on, the balance shifted. Today, the biggest challenges arise in the course of implementing policy, and perhaps inevitably, most innovation is taking place in the schools. When the system works best, city and state directives kindle and guide experimentation in the classroom—new ideas and practices that the bureaucracy can later help replicate at other programs. When the system doesn't work, regulations hinder on-the-ground experiments, and innovation grinds to a halt.

The challenge for New York in the years ahead is to maintain the pace of innovation and take it to the next level, realizing the ideals embodied in the state's implicit CTE charter—Albany's ambitious requirements for CTE program approval—with new ideas and new ways of doing things in the schools. The momentum behind the New York CTE movement is far from spent: we expect continued change and innovation for years to come, along many dimensions. What we have singled out below are two policy areas—student work experience and state approval of CTE teachers and credentials—where we fear the guidelines at the top may not be spurring or permitting the kind of experimentation necessary for CTE to realize its full potential in New York.

### ***More Students Need Work Experience***

The New York CTE movement is a success by many measures, but the dimension where it's falling the shortest arguably outweighs all the others. The heart of effective CTE is work experience. Yet only a small percentage of New York CTE students ever spend a day on the job in a workplace—not just visiting, observing, or chatting with a mentor, but actually working and learning from the experience, honing their technical skills and work habits.

CTE programs across the U.S. struggle with the same challenge. Most American employers no longer see it as their responsibility to train future workers. They're too busy or too strapped or don't feel that they have a stake in building a pipeline for the future. Most are especially hesitant to invest in less skilled or entry-level workers, and bringing untrained high school students into the workplace is beyond imagining for many companies. The upshot for educators: it can be all but impossible to secure work-based placements for high school students. Still, New York CTE programs must try harder, and succeed, or their promise to students will be worthless.

A big part of the problem in New York traces back to state directives: the definition of work-based learning that encompasses everything from a guest lecture by a company executive to job shadowing, field trips, career fairs, skills competitions, mentoring, and, in a minority of cases, time spent on the job in an internship. Educators defend this spectrum of activities. It's a progression, they say, and cumulative; one New York reform advocate called it a "ramp." And no doubt this is true: other forms of work-based learning are important and valuable for young people. But not enough students in New York CTE programs are getting to the top of the ramp.

Change will take time. It will require new thinking and, more important, new practices across the system. We propose three top-down policy reforms that we believe can trigger this system-wide revamping.

New York can start by overhauling state performance measures for work-based learning. Existing requirements stipulate that all New York CTE programs "have a sequence of grade-appropriate work-based learning experiences (career exploratory activities, mentorship, and industry-based career-related competitions) that culminate in opportunities for internships."<sup>37</sup> It's an ambitious mandate, in many ways appropriate for a high school setting—the early steps in the sequence are just what's needed in ninth and tenth grade. But the language creates a dangerous loophole that far too many schools are slipping through: not just the concept of a



“sequence” but also the vague term “opportunities.” Bottom line: schools aren’t being held responsible for placing students in internships. No wonder they aren’t succeeding.

A new, improved mandate would distinguish actual work experience—internships or some other kind—from the rest of the work-based learning spectrum. The goal: to measure on-the-job time in isolation, making schools answerable for their performance on that metric alone. The existing mandate—the spectrum—should not be abandoned. But it’s not enough. What gets measured gets improved, and New York schools need to measure their success in arranging on-the-job work experience for high school juniors and seniors.

The second prong of a threefold reform: along with the new mandate should come increased resources—funding and other help with the difficult task of securing work-based placements.

CTE advocates in New York and elsewhere are divided about what works best in arranging placements. Some maintain that educators alone can’t do it; what’s needed is an independent cohort of nonprofit intermediaries that build and sustain relationships with employers, prepare students, help structure what interns are asked to do in the workplace, manage day-to-day details, and troubleshoot. Others—often principals and other school-based personnel—argue that only the schools can play this role. They welcome additional resources; they envy schools where the partnering company sends an industry liaison. But in the end, they say, the relationship works best when school and company connect directly and someone on the team has close personal knowledge of individual students.

Neither Albany nor city hall is in a position to decide which approach is most effective—they don’t have enough evidence and are too far removed from the problem. What’s needed is funding for further exploration of both alternatives. The simplest, most efficient, mechanism would be to give schools supplementary funding dedicated to developing relationships with employers and placing students in the workplace, then allow school officials to spend that money as they see fit—hiring in-house staff or paying for the services of an intermediary.

Existing regulations require all New York CTE programs to employ a work-based learning coordinator; but most are CTE teachers carrying a full teaching load, and most schools report that they need at least one full-time person, if not several, to get the job done. The new supplemental funding, which ought to come from existing education monies, should be enough to cover the services of a nonprofit intermediary or an adequate, full-time, in-house staff, ideally including staff with industry

experience. It might be a per-student supplement or calculated on another basis, but either way, it ought to be enough to cover whichever option is most expensive, giving schools a genuine choice. If a market-driven approach of this kind works as it should, it will settle the argument between those who favor intermediaries and those who think that school staff are best placed to arrange and manage work-based placements. And the people closest to the problem—the schools that need the service—will decide what works best for them, without intervention from Albany or city hall.

Together, these two reforms—a new mandate and new resources to meet it—ought to go a long way toward improving New York CTE students’ opportunities for bona fide on-the-job work experience at a company. But even this package will not be enough if New York educators don’t also make a third change: engaging a different type of employer than they have generally engaged in the past. Schools need to build more partnerships with companies looking to hire high school graduates or associate’s degree holders.

As is, many employers who partner with New York CTE schools do so for philanthropic reasons: to do good; to improve their corporate image; or to demonstrate their concern about poverty or diversity. None of these are bad motivations. But they don’t generally drive the same kind of engagement or results as self-interested, bottom-line motives, such as a pressing worker shortage. What’s needed across New York City’s 270-plus CTE programs are fewer partnerships with companies driven by a sense of corporate social responsibility and more relationships with employers who need the relationship for their own survival reasons.

Driving such a change will not be easy. New York officials can’t mandate it. They can’t and shouldn’t bar schools from developing partnerships with businesses driven by charitable motives. At this early stage, with most CTE schools struggling to find work-based placements of any kind, no employer partnership is an undesirable partnership. But more needs to be done—by the city and state, nonprofit intermediaries, and in-school personnel—to seek employers who can offer jobs to students who complete internships and graduate from high school with meaningful industry credentials or associate’s degrees. What the education bureaucracy and city leadership can do in the short term to spur a shift of this kind: articulate the goal and develop guidance—specific criteria and concrete steps—for schools and nonprofits seeking to engage with employers in a position to hire students.

### ***A New Process for State Approval of CTE Teachers and Industry Credentials***

The subject comes up at every New York CTE school. It's the top concern of virtually every on-the-ground CTE educator. State approval of CTE teachers and industry credentials is not keeping up with advances in the cutting-edge industries that partner with New York City CTE programs.

It's a classic example of the cultural divide between employers and educators that makes CTE partnerships such a challenge in the first place. Companies move fast, adapting to a shifting marketplace. There's a premium on innovation and action and getting things done in real time. And this is especially true in the new-economy companies that are the partners of choice for New York's most adventurous and innovative CTE programs.

The problem is compounded many times over by the hybrid, improvisatory culture at most start-up CTE schools—programs that are often defining their mission and writing new curricula even as they open their doors to students. Something as routine for most principals as recruiting classroom teachers can be a major undertaking for a CTE school: instructors need industry experience and teacher training, and most are used to much higher salaries than the Department of Education pay scale allows. Meanwhile, city and state bureaucracy aren't just hidebound and slow. They're also, to their credit, committed to maintaining standards for the school system—standards that don't easily accommodate innovation or improvisation and which change slowly, if at all.

How to keep up with innovation while maintaining standards and quality control? The current system in Albany is a traditional gatekeeper model. The state education department maintains lists of approved CTE schools, approved CTE career pathways, approved industry credentials, and approved CTE teacher certifications. For teachers and programs applying for approval in an existing category, the system works reasonably well, if sometimes slowly. Instructors seeking certification in food-service occupations, for example, rarely encounter problems. There are also categories for construction, cosmetology, vehicle maintenance, and precision metalworking, among other traditional occupations.

But there is no box in the taxonomy for an aquaculture specialist or an emergency-management technician. So people seeking to teach those subjects apply for what is inevitably arduous and time-consuming approval in the catch-all category “unique or emerging occupations.” Even slower and more burdensome, they can request that the state create an entirely new category for their specialized field.

A better, more accommodating approach would abandon the taxonomy, or create an expedited, alternative path alongside

it—one more flexible and responsive to innovation. Under this alternative model, schools and their industry partners would apply for approval, just as they do now. The state education bureaucracy would maintain its authority to reject them—nixing schools, teachers, career pathways, and technical assessments that don't make the grade. But instead of maintaining a list of categories that educators have to demonstrate they fit into, under a new approach, the state would consider each application on its own merits. The questions would no longer be, Is it on the list? or Does it fit?—but rather, Does it work for the situation it's designed to work for? Does it meet appropriate criteria?

Consider the technical assessments that can now be substituted for Regents exams—generally industry-generated hands-on and written tests that earn students industry-recognized occupational credentials. Almost no one in the New York CTE system thinks that the state's list of 14 approved assessments is adequate. The list doesn't cover most of what's being taught in New York CTE schools, and educators are clamoring for Albany to add assessments. But simply extending the list isn't likely to solve the problem: it's too slow and laborious a process and far removed from changes taking place in business and industry.

An alternative approach would put aside the list and evaluate assessments on a case-by-case basis, as requested by CTE schools and their industry partners. It would be important that the application come from the school and its employer partner. After all, only employers know what certifications are currently valued in their industries—used by companies to make decisions about hiring and promotion. And the employer should be required to show that the assessment is recognized by other companies in the industry—in New York State, perhaps, or nationwide.

Other appropriate criteria for judging occupational assessments: Does the test measure hands-on skills as well as on-paper knowledge? Is it designed and administered by a third party—someone other than the school providing instruction? Does it measure the skills that it's supposed to measure in a way that's appropriate for high school students? Is it reviewed and updated on a regular basis to keep up with changes in the industry? These are simple, functional metrics, not generally difficult to apply. And if an assessment meets them, it ought to be approved by the state—whether or not it's on the current list.

The payoffs to reform of this kind would be flexibility and adaptability. It need not mean lower standards. Technical assessments that can be substituted for Regents exams must be rigorous as well as valuable in the marketplace. But Albany's process for vetting credentials is not producing the rigor that's needed. The state needs a better system.

## VI. Conclusion

The CTE revolution is no different from any other. In every revolution, there are two phases: the big breakthrough—a set of new ideas, a scientific discovery, a new technology—then implementation. History shows that the second phase is often where the biggest changes occur, as people develop new uses for a new technology, for example, and those uses produce changes leading to yet more changes—a cascading evolution. New York State’s criteria for CTE program approval capture all the best ideas of the first phase of the CTE revolution. New York City’s 270-plus CTE programs are in the vanguard of the second phase, and the fruit of their experimentation and innovation will likely drive further changes and better programs for years to come, in the city and beyond. New York is on the right track. But a few critical improvements could help it chart and pursue an even more promising course.

# Endnotes

- <sup>1</sup> This paper draws on some three dozen interviews and New York school visits conducted in late 2015 and early 2016. The authors were granted generous access, including in classrooms across the city, on the condition that no school be singled out on the basis of the visits and no education official, school administrator, teacher or student be quoted by name.
- <sup>2</sup> See <http://www2.ed.gov/policy/sectech/leg/perkins/index.html>.
- <sup>3</sup> New York City Department of Education.
- <sup>4</sup> See <https://www.whitehouse.gov/the-press-office/2013/02/12/remarks-president-state-union-address>.
- <sup>5</sup> New York City Department of Education.
- <sup>6</sup> See <http://www.p12.nysed.gov/ciai/multiple-pathways>.
- <sup>7</sup> See <http://www.gatesfoundation.org/Media-Center/Press-Releases/2003/09/New-York-City-Department-of-Education-Receives-Grant>.
- <sup>8</sup> See <http://schools.nyc.gov/NR/rdonlyres/B881BA2E-4D18-4BB1-9797-C0DA072128D2/145079/CTETaskForcePreliminaryRecommendations61108.pdf>.
- <sup>9</sup> See <https://www.newyorkharmorschool.org/about/history>.
- <sup>10</sup> New York City Department of Education.
- <sup>11</sup> See, e.g., <http://www.careertech.org/career-clusters>.
- <sup>12</sup> New York City Department of Education.
- <sup>13</sup> See, e.g., <http://economics.mit.edu/files/3024>; and <http://www.coweninstitute.com/wp-content/uploads/2010/03/New-York-and-Endnotes-Case-Study-11-2011.pdf>.
- <sup>14</sup> New York City Department of Education.
- <sup>15</sup> Ibid.
- <sup>16</sup> Ibid.
- <sup>17</sup> Ibid.
- <sup>18</sup> Ibid.
- <sup>19</sup> Ibid.
- <sup>20</sup> Ibid.
- <sup>21</sup> Ibid.
- <sup>22</sup> See <http://www.p12.nysed.gov/cte/ctepolicy/applications.html>.
- <sup>23</sup> See <http://www.p12.nysed.gov/ciai/multiple-pathways>.
- <sup>24</sup> See <http://www.p12.nysed.gov/cte/ctepolicy/applications.html>.
- <sup>25</sup> See [http://pfnyc.org/wp-content/uploads/2016/02/CTE-Survey\\_Schools\\_Final-Results\\_2015.pdf](http://pfnyc.org/wp-content/uploads/2016/02/CTE-Survey_Schools_Final-Results_2015.pdf); and [http://pfnyc.org/wp-content/uploads/2016/02/CTE-Survey\\_Employer\\_Final-Results\\_2015.pdf](http://pfnyc.org/wp-content/uploads/2016/02/CTE-Survey_Employer_Final-Results_2015.pdf).
- <sup>26</sup> See [http://www.ptechinc.org/site/default.aspx?PageID=1&cm\\_mc\\_uid=08302842159214565094785&cm\\_mc\\_sid\\_50200000=1456522748](http://www.ptechinc.org/site/default.aspx?PageID=1&cm_mc_uid=08302842159214565094785&cm_mc_sid_50200000=1456522748).
- <sup>27</sup> See <http://www.energytechschool.org>.
- <sup>28</sup> See, e.g., <http://schools.nyc.gov/ChoicesEnrollment/High/Directory/school/?sid=4688>; and <http://www.wnyc.org/story/312700-city-announces-three-more-early-college-high-schools>.
- <sup>29</sup> See [http://pfnyc.org/wp-content/uploads/2016/02/CTE-Survey\\_Employer\\_Final-Results\\_2015.pdf](http://pfnyc.org/wp-content/uploads/2016/02/CTE-Survey_Employer_Final-Results_2015.pdf).
- <sup>30</sup> See <http://www.nyctecenter.org/spn/page/Approval-Process>.
- <sup>31</sup> See, e.g., [http://www.ccrscenter.org/sites/default/files/CCRS%20Center\\_Predictors%20of%20Postsecondary%20Success\\_final\\_0.pdf](http://www.ccrscenter.org/sites/default/files/CCRS%20Center_Predictors%20of%20Postsecondary%20Success_final_0.pdf); and <https://www.ohiohighered.org/sites/ohiohighered.org/files/uploads/completion/Predicting-Success-in-College-The-importance-of-placement-tests-and-high-school-transcripts.pdf>.
- <sup>32</sup> See <http://www.p12.nysed.gov/cte/wbl>.
- <sup>33</sup> See <http://urbanassembly.org/strategy/cte-career-technical-education>.
- <sup>34</sup> See <http://www.p12.nysed.gov/ciai/multiple-pathways>.
- <sup>35</sup> See <http://www.nrccte.org/core-issues/industry-recognized-credentials>.
- <sup>36</sup> See <https://www.luminafoundation.org/files/resources/making-the-case.pdf>.
- <sup>37</sup> See <http://www.p12.nysed.gov/cte/wbl>.



## Abstract

Once one of the most disparaged forms of education in the United States, what used to be called “vocational education”—now renamed “career and technical education,” or CTE—has emerged in the past decade as one of the most promising approaches to preparing students for the future. New York City is at the forefront of the national revolution in career education.

## Key Findings

- 1.** The number of New York City high schools dedicated exclusively to CTE has tripled since 2004 to almost 50; some 75 other schools maintain CTE programs; 40 percent of high school students take at least one CTE course, and nearly 10 percent attend a dedicated CTE school.
- 2.** Data on outcomes are still limited, but evidence suggests that young people who attend CTE schools have better attendance rates and are more likely to graduate; students in comprehensive high schools with CTE programs also appear to score better on standardized tests than those at schools with no CTE offerings.
- 3.** Following a decade of bold changes in city and state policy, the front lines of innovation have shifted from offices in Manhattan and Albany out to schools across the five boroughs, where educators are working—some more successfully than others—to implement the essential elements of the new CTE.