EDUCATION FOR UPWARD MOBILITY

The Certification Revolution

Tamar Jacoby

Daniel Gamez is no one's idea of a traditional postsecondary student. He finished high school decades ago and at the time had no interest in college. The San Antonio economy was booming, jobs were plentiful – and he was in a hurry to get to work. He started as a construction laborer, then headed off for a couple of years in the military. The Army was good to him: he got some exposure to working with computers. And when he got home to Texas, ready to start a family, he went back into construction in a well-paying technical job – designing and assembling roof trusses. He made a good living for more than a decade, but then in the downturn, technology caught up with him. Automated roof truss assembly replaced manmade design, and Daniel found himself once again wondering how to make a living. He fell on hard times, moved back in with his parents and ended up in an accident that ruled out any job requiring physical labor. By 2014, he was at a loss, uncertain where the next paycheck would come from.[1]

That's when he heard about the course in IT networking being offered at a local vocational training center, the Goodwill Good Careers Academy. No one would mistake the academy for a college. It's a small storefront building in a neglected neighborhood near downtown. Many of the other students, struggling to get off public assistance, would be intimidated even at community college. But for Daniel, it's a lifeline – and unlike college, within his reach. The course he signed up for requires 300 hours over six months, half in a classroom and half in a computer lab. Daniel can live at home and work almost full-time while he's studying. Goodwill staff are attentive and encouraging, and tuition is a fraction of what he'd have to pay at college – just $3200.

But the prize Daniel is aiming for is as valuable as many college degrees: A+ and Network+ certifications from the computer-industry trade association, CompTIA. Recognized around the world in the IT business and beyond, CompTIA certifications are widely seen as the entry-level qualifications for computer technicians.[2] Unlike a degree, certification says nothing about how or where you studied, simply that you passed a performance-based test demonstrating required knowledge and abilities. Test takers prepare in a broad array of venues: high schools, community colleges, franchised for-profit learning centers, voc-tech academies like Goodwill or, very often, self-study on the internet. A first, basic certification gets you a first job, then many technicians continue studying while they work, adding test-based credential on top of test-based credential over the course of a lifetime. Average salary for technicians with Network+: $71,000.[3] Daniel's dream: to start at a local company, not necessarily IT, working in-house to maintain its servers, then build from there, aiming eventually for a top IT firm.

Daniel's story isn't unusual. On the contrary, he's on the cutting edge of a burgeoning trend: alternative, competency-based credentials. It's the hottest new idea you've never heard of, and it's coming soon to a movie theater near you – if it isn't showing already.

CompTIA credentials capture the essence of the idea, which can be broken down into two components: learning targeted at a specific job and learning certified by a test that can be prepared for in many ways, in school and out. But this isn't just about IT; it's an approach transforming training in many technical fields. It isn't just for at-risk students or people like Daniel, down on their luck. And the truth is it isn't just about vocational training. Job-

focused, competency-based learning is poised to transform education as we know it – academic and vocational education.

Already, according to the Census Bureau, 25 percent of U.S. adults, or more than 50 million people, hold a non-degree credential – a professional certification, license or educational certificate.[4] The federal government is bullish on the concept. Business leaders – from the National Association of Manufacturers to the Business Roundtable, from Microsoft to a generation of mom-and-pop construction firms – are changing how they do business to accommodate the new approach. Ferment and enthusiasm stretches across the political spectrum: from big-government Democrats to free-market Republicans – different groups have different ideas about how to make the model work in practice. And the nation's leading education foundations are pouring millions of dollars into refining and advancing what they see as a transformative idea with ramifications for both secondary and postsecondary education.

An Idea Whose Time Has Come

Where did the idea come from and why is it taking off now?

Both non-degree credentials and competency-based learning have been around a long time, albeit mostly below the radar and often looked down upon by the education establishment. Before there were industry-recognized credentials, there were licenses. Tests, usually administered by a state or municipality, assessed workers' knowledge of their trade and certified them to work – as a nurse or plumber or commercial truck driver. Community colleges worked in parallel to offer occupational training that culminated in a certificate: usually a year-long program of study, though often not for credit and not captured in national education statistics. And going back all the way to World War II, it was possible for students who had learned a skill in the military or later the corporate world to translate that knowledge into college credit. But few young people aspired to come up this way – it was a path of last resort. And nobody saw these mechanisms as anything like a transformative idea – one that could unlock the future for millions of Americans.

What changed? It's too easy to sum it up with one word, MOOC – but MOOCs and other online learning are part of what's propelling the new approach. Millions of students and others are talking courses online, often from A-list instructors. But many find it difficult to get credit for what they're learning; most colleges are still hesitant to acknowledge online courses they don't provide themselves. For many students and would-be students, this is just one more affront fueling a broader crisis of faith – the spreading wave of doubt about higher education being driven by rising debt and falling return on investment. And not just students, but politicians are starting to push back. Public figures as different as Vice President Joe Biden and Florida Republican Senator Marco Rubio are demanding that colleges find a way to incorporate what students learn elsewhere into the mix of knowledge and skills they reward with credit. "Free online learning is already a reality," Sen. Rubio said in a much-publicized speech early this year. "We just need the established system to catch up," allowing online classes and other independent learning – at home, at work and elsewhere – "to count . . . toward a degree."[5]

A second important change is taking place out in the world of work: the skills gap. Information technology and globalization are transforming the American workplace, phasing out many low-end jobs and putting a premium on technical skills. Americans are more and more educated: many more go to college today than just a generation ago. But they often aren't learning the right skills. Even with 9.6 million Americans unemployed, businesses across the country report 4.7 million job openings.[6] Companies in a range of sectors – IT, finance, manufacturing, health care and construction, among others – report worker shortages and often crippling skills mismatches. And the mismatches are likely to grow worse in years to come.

Labor economists predict that at least one third and perhaps half of all jobs coming online in the next five years will be "middle skill" – requiring less than a B.A. but more than a high school diploma, in most cases some kind of technical training.[7] These aren't old-fashioned factory jobs: today's technical workers are more likely to man computer controls than greasy machines, and they often take home a middle-class paycheck. Yet many Americans still look down on technical skill. And few educators see it as their role to prepare students for the world of work– that's viewed as somehow dirty or ignoble, mere training as opposed to education. But increasingly strapped employers are clamoring for change – education geared more closely to skills needed on the job. And if they can't get what they need from the education system, many are determined to find another route – working around the system or coopting it to their own ends, by developing their own credentials.

Finally – a third force driving the rise of alternative, competency-based credentials – the American college student is changing, and has been for many years. We all know the old student: 18 to 22 years old, single, middle class, probably white, living in a dorm at a four-year school and aiming to get a degree there, then go off to work. Truth is, that kind of student is less and less common today. More than 40 percent of undergraduates are more than 24 years old; one quarter are over 30.[8] Roughly the same fraction – 25 percent – are parents, and half of those are single parents.[9] Just six in ten are white.[10] Only 15 percent live on campus at a four-year residential college.[11] Only half are enrolled full-time.[12] Four out of five work, half of them full-time – and the average work week is 30 hours.[13] Community college is almost as popular as four-year schools: it now accounts for 45 percent of students.[14] And just four in 10 undergraduates attend a single college – the rest transfer at least once before earning a degree.[15]

The term of art for these young people is *nontraditional student*, and not surprisingly, what they want and need from college is very different from what old-style students wanted.

The reason most nontraditional students attend college is to get a job, or a better job. So they want an education that teaches job skills – the more targeted and up-to-date and geared to what's happening in the changing job market, the better. They're also in a hurry. Nontraditional students are older, they're working – many are juggling school, family and work. They don't have the luxury of time – and often see the way more conventional students go through school as wasting time. Most want to get through college as quickly as possible. It's often difficult for them to make long-term commitments: Daniel Gamez

couldn't imagine signing up for a two- or four-year package of full-time classes. Nor do they want to stay in college any longer than necessary and pile up debt. The upshot: many can't cope with the pace and duration of conventional college. Large numbers give up after just a year: 25 percent of freshmen at four-year schools and a full half of those who enroll in community college.[16] And one-fifth of the U.S. workforce – more than 30 million adults – fall into the category "some college, no degree."[17]

Put the pieces together, and they all point in the same direction – change. Employers want more skilled workers. Students want a quicker, cheaper, more streamlined college experience, targeted and purpose-driven, preparing them for the world of work. And far too few colleges are responding – many are ignoring these demands or actively resisting them. But the pressure is growing: a new movement is gathering steam, largely outside the academy, poised to upend some of the most deeply rooted assumptions in American education.

What Is An Alternative Credential?

Alternative credentials come in a variety of shapes and forms – and the movement behind them is so new that many terms and definitions are still in flux. It doesn't help that the terminology itself is a little confusing: a certificate is not the same as a certification, and neither are the same as licenses or digital badges or prior learning assessments or upside-down college. All are tools for translating competency into terms that mean something in the academy or the workplace.

The three biggest ticket items are certificates, certifications and licenses – and the terms cannot be used interchangeably.[18]

A certificate is the closest to a degree – awarded by an educational institution on completion of a course of study. The subject is often more narrow and more occupationally focused than the subjects in which students get degrees, and the course of study is generally shorter – most certificates require only a year or two. But as with a degree, earning a certificate requires attendance at an educational institution and seat time in class, and once you've earned it, it lasts forever – there's no need to renew it with continuing training or periodic exams. Some of the most commonly awarded occupational certificates: in auto mechanics, electronics, construction, healthcare, cosmetology and basic office work. Over the past decade, the popularity of certificates has skyrocketed, testifying to students' interest in occupationally focused education and training – from 300,000 certificates awarded in 1994 to roughly one million in 2012.[19]

Certifications and licenses are altogether different. Unlike certificates, neither requires time in class, certainly not at any particular educational institution. What they signal is not attendance but mastery of a set of occupational skills, usually assessed by a test – often a conventional on-paper test and a hands-on performance-based test. As with CompTIA Network+, the skills certified by the credential can be learned anywhere – at a traditional educational institution or somewhere else, including in many fields, self-study. It's the

essence of competency-based learning – what matters is knowledge and ability, not where or how it was learned.

The difference between licenses and certifications: licenses are issued by government agencies, usually a state or municipality, and they grant legal permission to perform an occupation in that jurisdiction. Occupations for which licenses are commonly required: electrician, cosmetologist, nurse, commercial driver and real estate broker, among many others. Certifications are more likely to be awarded by an independent third party – a company like Microsoft, a trade association like CompTIA, a professional association like the Association of Clinical Research Professionals, a nonprofit like the Wildlife Society or some other autonomous group with an interest in maintaining occupational skills standards. The occupations where they are most common: health care, IT, advanced manufacturing and the construction trades. Unlike certificates or degrees, both licenses and certifications must be renewed. You often have to take the test again three or five years later; in other cases, it's enough to provide evidence of ongoing learning.
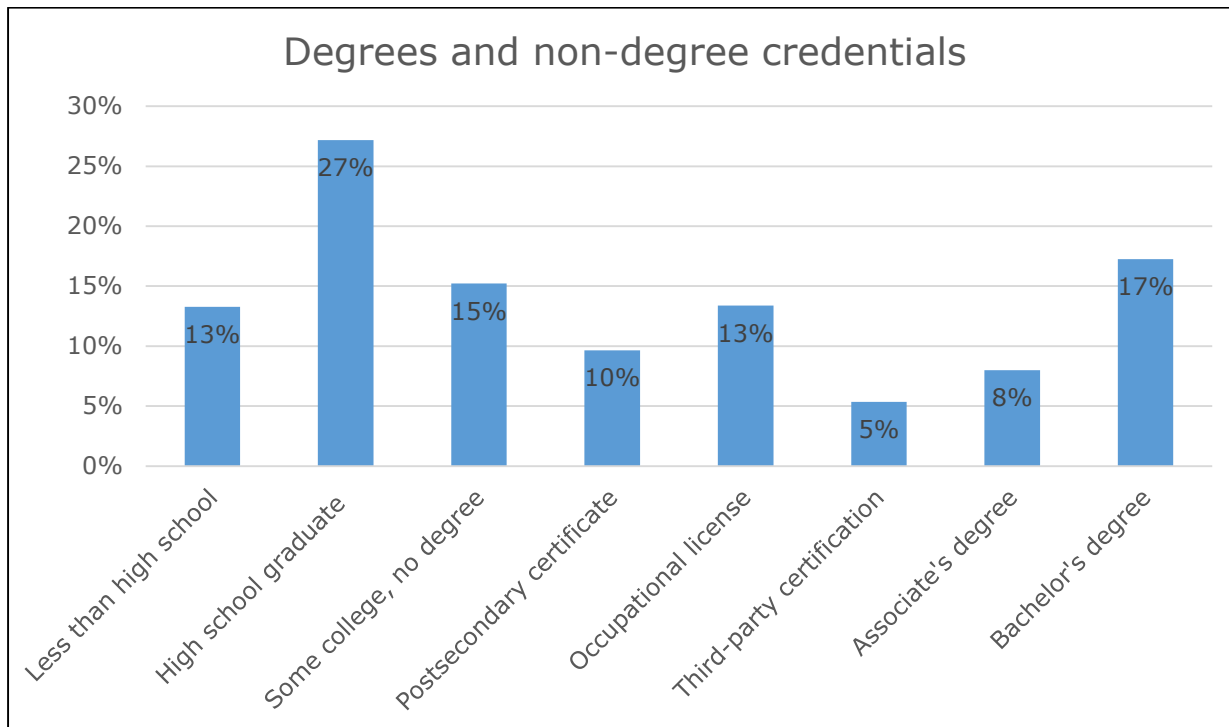
A number of things flow from this basic difference between licenses and certifications. After all, if what's being measured are your qualifications to work, it makes a big difference whether those qualifications are established by someone likely to employ you or by the government.

Employers are by definition more likely than state agencies to be concerned about ability to get the job done. An employer-driven certification like CompTIA's Network+ is more likely to be up-to-date. Nothing is less useful to an employer than an employee with outmoded skills – whereas government agencies often lag behind the times. Licenses are mandatory in the jurisdictions where they apply. They determine who may and may not work. Certifications are generally voluntary and more likely to be inclusive than exclusive. Most of the employer groups driving them hope to enlarge the pool of qualified employees, not restrict or bar workers. Ideally, government licensing agencies are concerned primarily about safety, but in practice, many licenses are under attack for restricting competition among service providers – erecting barriers to entry, creating labor market shelters and suppressing innovation. No one has yet leveled any of these charges against the new generation of employer-driven certifications.

The Census Bureau has only just begun to count the number of Americans who hold non-degree credentials. The first inquiry was in 2012, part of the Survey of Income and Program Participation, or SIPP.[20]

Licenses are the most common non-degree credential. Professional licensing has mushroomed since the 1950s, when only 5 percent of occupations required a license – compared to nearly one in three occupations today.[21] According to the SIPP survey, some 13 percent of Americans 16 and older hold a license to work, some of them highly educated professionals, such as doctors, some lowly tradesmen. Certificates, though also growing fast, are by definition a narrower category: 10 percent of adults hold occupational certificates. And certification is rarer still, in part because it's newer. According to SIPP data, 5 percent of adults hold certifications issued by a company, a trade association or a

nonprofit organization. (By comparison, according to the same survey, 8 percent of Americans hold associate's degrees and 17 percent have bachelor's degrees.)[22]

Degrees and non-degree credentials

Credential	Percent
Less than high school	13%
High school graduate	27%
Some college, no degree	15%
Postsecondary certificate	10%
Occupational license	13%
Third-party certification	5%
Associate's degree	8%
Bachelor's degree	17%

NOTES: Educational attainment, occupational licensing and certification as percent of the population, age 16 and over. Opportunity America calculations based on results from the 2008 panel of the U.S. Census Survey of Income and Program Participation. Percentages add up to more than 100 because many people with degrees also hold non-degree credentials. Graduate and professional degrees are not included.

Certifications are the smallest slice of the pie, but they are the credential generating the most excitement in reform circles. The rapid growth of certificates and certifications signals that more Americans are continuing their educations after high school – thrilling news to any educator. And both attest to growing interest in occupational education and training – instruction designed expressly to prepare students for the world of work. The problem with some certificates: without input from employers, many community college courses teach outmoded computer code or old-fashioned welding techniques, no longer in use in the workplace – and college courses don't always include hands-on training. Certifications, usually developed by employers, are far more likely to produce workers with skills in demand in the marketplace. Their promise to students: this is the content you need to know to get a job. Their promise to employers and potential employees alike: these are workers equipped with the skills to succeed in today's economy.

The Brave New World of Industry Certifications

The certifications issued by the National Institute for Metalworking Skills aren't new – they were launched nearly 20 years ago. But they are among the most successful industry credentials to take off in recent years – and a telling example of how third-party certification works. How does an industry develop a credential that truly reflects the skills needed in a changing technical workplace? And how is it used on the ground – by employers, educators and trainees?[23]

Precision machining is the high end of the manufacturing business. These are the firms that make the machines that make the things consumers use. Products are metal parts, instruments and tools – and in the age of robotics, they have reached a level of complexity and accuracy almost beyond imagining. Machinists used to wear goggles and overalls and get grease on their hands from dirty lathes. Today, most machinists work computer controls, standing outside booths that look something like MRI machines. The grinding, stamping, tooling and lapping happens inside the immaculate box. There's no dust or grease in the laboratory-like room. Parts are measured to the .0005 or .0001 of an inch. A precision machining firm's customers are mostly other companies – in the medical, automotive and aerospace sectors, also construction and oil and gas exploration. And many downstream manufacturing firms also need machinists: someone to operate the robots doing the machining on their production lines. According to the Manufacturing Institute, the research arm of the National Association of Manufacturers, there's virtually no limit to the demand for machinists today – and a skilled technician can make $70,000 a year. [24]

The NIMS credentialing system operates on the same basic principles as CompTIA's. The institute doesn't write curriculum, it doesn't offer courses. What it produces are tests that measure trainees' skills. But by designing tests and setting standards, it drives curricula and training nationwide. Training providers – high schools, community colleges, vocational training centers – teach to the test. Trainees aspire to its standards and, when they pass an exam, get a nationally recognized credential. Employers who hire credentialed workers know what they're getting – something they can't otherwise count on, because training quality varies from school to school and grade inflation often obscures whether trainees have needed skills. The credentialing system aims to standardize and upgrade the machining workforce so that everyone benefits – employers, employees and educators, who can now be sure their courses are relevant, preparing students for the real world of work.

A student who wants to become a NIMS certified machinist starts by looking for a school that teaches to the exam. Venues, curricula and teaching methods vary – NIMS expects that. Some schools offer credit for their machining courses; some don't. Some award certificates or degrees. It's all irrelevant to NIMS and to most employers who look to NIMS credentialing. The assessment that matters to them is a NIMS test. Each test has two components: one written, taken and graded on a computer, and a performance-based piece. Students get specifications for a series of machine parts that they produce on their own time, on whatever equipment they have access to.

The one thing NIMS insists on: the school or voc-tech center or industry association that provides the training cannot administer the test or judge it. It's an all but universal

requirement of the new generation of industry certifications: the separation of instruction and assessment – after all, most teachers feel some stake in their students' success. The parts submitted for the performance-based part of the exam must be exactly as specified in order to pass – 100 percent correct within the tolerance specified on the plan, whether .0005 or .0001 of an inch. "That's the standard that counts on the job," says NIMS executive director, James Wall. "One dimension off, and it's a scrap part."[25]

Total cost for a trainee: free at public high school, ordinary tuition at community college, plus $75 in fees for the NIMS test. Students can often get through several modules in the NIMS curriculum and take several tests in the course of a semester.

The NIMS system offers 52 different tests: entry level, journeyman and master craftsperson in two dozen different machining specialties – machining, metal forming, stamping, machine maintenance and repair, among others. The goal is to create a clear, streamlined path from school to work and then from entry-level job on up a ladder of machining skills – what educators call a "career pathway." If you take a course at a cooperating school, you're en route to passing a certification test, which then increases your chances of getting a job – at which point, the institute hopes, you'll start training for the next level. The term for this is "stackable," and it's another core requirement for nationally recognized industry credentials.

It's an ideal answer for nontraditional students, who often can't commit at first to a very long or deep course of study. But once they get started on the job, many want to move up and will continue to train if they have the tools – ideally a series of short, bite-sized modules and a graduated sequence of credentials that allow them to progress at their own pace over a lifetime of learning. Some students start as early as high school, then attend a community college that recognizes their NIMS credential. Other machinists are still taking NIMS' most advanced exams well into their professional careers.

The challenge for NIMS is making sure the tests reflect the things employers want and need: the right skills, the right level of skill and up-to-date – changing with a cutting-edge industry buffeted by globalization and evolving technology. If the institute's tests don't meet this standard, they're meaningless – just one more guild-driven barrier to entry, not likely to appeal to employers or educators, and useless to students. So NIMS spends an inordinate amount of time and money developing and refining and revising its standards.

The tests are just the tip of the iceberg: what's difficult is deciding what should be measured. The institute manages an elaborate consultative process that draws on some 6000 employers nationwide to decide which skills matter and what level of performance is needed on the job – should the minimum tolerance be .0005 or .0001 of an inch, for example. The process starts with subject matter experts, practitioners from the field who analyze the skills and "competencies" that go into every machinist's task. Next comes regional validation by hundreds of employers in the NIMS network, then more deliberations by the original technical working group, then more national validation. And this is all before there's even a test: that too is a consensus product, designed by a first group of experts, adjusted by others, beta-tested in the field on hundreds of trainees and

then revised again. Altogether, the process takes more than a year and costs $350,000. And every test is revisited on a regular basis, every five years.

NIMS works hard to market its tests – to create a market for certification in a field that had no industry standards in the past. It's a three-part effort: convincing community colleges and other schools to upgrade their training programs, convincing employers to adopt NIMS standards and convincing students that it's worth their while to bother with the tests. The institute has had help in recent years. The nation's leading education foundations – Gates, Lumina, Joyce and ACT – have spent millions of dollars to spur the development and use of industry certifications. NIMS is one of several credentialing bodies benefiting from this push – and the NIMS tests are taking off, albeit a little unevenly.[26]

Among the institute's targets, community colleges are the most excited and enthusiastic, followed by state high school authorities. Hundreds of schools across the country are now teaching to NIMS tests, and many are also applying to be accredited by the institute. Student demand is mushrooming: the number of credentials awarded annually increased by 60 percent in 2013. The absolute number of trainees taking the tests is still relatively small: some 14,000 last year. And ironically the small and medium-sized employers who make up most of the metalworking industry have been the slowest to adopt the system. Many say they have trouble enough finding skilled employees, and they hesitate to erect additional barriers for potential hires. So far, only about 10 percent of the industry is requiring that job applicants have NIMS credentials. Still, institute staff are undeterred – and optimistic about the future. "It's chicken and egg," says executive director James Wall. "You can't expect a critical mass of companies to sign on until there's a critical mass of trainees with credentials. Once it gets going, it snowballs."[27]

A Parallel Universe

IT educators and employers know what NIMS executives mean about snowballing. The world of IT credentialing has been growing exponentially for two decades and shows no sign of letting up.

CompTIA alone – just one of several IT bodies that confer qualifications – has awarded nearly 2 million credentials since it began operations in 1993. The association offers 17 certifications across four levels – basic, professional, mastery and specialty. Some 3300 "partners" are authorized to teach to the tests, some of them small training centers like the Goodwill Good Careers Academy, others sprawling commercial empires with outlets around the globe.[28] New Horizons is one of the biggest: it operates 300 franchised training centers in 70 countries and prepares more than a million students a year for CompTIA and other tests.[29] Still another, separate global network of test centers administers CompTIA exams – remember, training and testing must remain strictly separate to maintain the integrity of an industry credential. Pearson VUE is one of the largest, with test centers in 175 countries.[30] And CompTIA is only one of several huge global IT credentialing bodies. Its tests are foundational, often prerequisites to further training – and dozens of other, vendor-specific credentialing operations maintain their own training and testing capacity around the world.

There is no official reporting system and little good data. But according to informal estimates, tens of millions of IT technicians have been awarded certifications since the system was inaugurated two decades ago. Microsoft maintains the biggest credentialing operation, then Cisco, then CompTIA.[31] The fastest growth is now in emerging countries. The hottest new technical area – certifying bodies scramble to keep up with changes in the industry – is cloud computing.

The explosive growth of IT certification points to what's possible: the transformative potential of non-degree credentialing – exhilarating to some and perhaps alarming to others. IT training and certification is a world in and of itself, what one early chronicler called a "parallel universe" – largely unregulated and ultimately very different from traditional higher education.[32]

It's a world with its own schools, its own tests, its own curriculum developers, its own online publishing industry. Unlike in the traditional education system, there's no selective admission, no required coursework, no counseling, no tenure. Most trainers, the testers and the credentialing organizations operate outside the federal system of financial aid and data collection. There's no oversight by conventional accreditors, federal or regional. And the student, rather than the faculty or the institution, is the center of the universe – what drives the system forward. Students study at their own pace, and all that matters is the skills they learn – not who they learned from, or how much time they spend in class, and certainly not the prestige of the school they attend. It's a world that's purely market-driven and unfettered by other concerns – a starkly efficient, no-frills system for equipping trainees with the skills to be successful while delivering the talent employers need.

Quality Control?

As non-degree credentials take off, one of the biggest challenges ahead is quality control. The new experimentation layered on top of old programs has produced a baffling array of paper attesting to the qualifications of students and trainees: not just diplomas, degrees, certificates, certifications and licenses, but dozens of different kinds of credentials within each category. Many different types of institutions and programs are issuing paper: community colleges, for-profit colleges, high schools, apprenticeship programs, franchised training centers, company-run training initiatives, union-run training initiatives, ad hoc online courses and more. Some credentials mean little or nothing. It can be hard to know if a given certificate is a certificate of achievement – or simply attendance or completion of a course. Students are paying for classes and taking on debt but often can't be sure the training will lead anywhere. The difficult question is what to do about this rich but sometimes dysfunctional ferment – what one researcher has called a "Wild West of programs" – particularly in a culture like the United States, suspicious of regulation.[33]

The problem is perhaps most acute for industry credentials, growing fast and among the least tethered to conventional institutions of higher learning. Credentialing organizations like NIMS and CompTIA take great pains to ensure the quality of their certifications – that's the reason for the subject matter experts, the nationwide employer feedback, the beta

testing and the rest. They and other organizations like them count on this bottom-up consensual process as a guarantor of quality and of their relevance in the marketplace. NIMS and many other bodies like it also act as accreditors. The institute has a process much like that of a regional college accreditor for evaluating and then approving of training programs, whether in an academic setting or at a company.[34] But not every industry group issuing credentials is as rigorous. And it's easy to imagine the system spinning out of control, with a welter of inferior credentials swamping the good ones and eventually undermining the currency.

A cadre of education reformers working to promote industry credentials – at foundations, trade associations, think tanks and elsewhere – has been grappling with this question for several years.[35] Many people's first inclination was to call for accrediting the accreditors. The American National Standards Institute, or ANSI, maintains protocols, dictated by the United Nations-backed International Organization for Standardization, for certifying certificates and certifications.[36] A private nonprofit Washington-based organization, ANSI oversees voluntary consensual standards for a wide array of products, services and personnel in the U.S. – everything from industrial safety standards to the shape and dimensions of electrical plugs. And many reformers hoped it would become the arbiter of industry credentialing.

The problem: the ANSI process is extremely time-consuming and expensive. Several CompTIA certifications are ANSI-approved, and the multistep process NIMS uses to develop credentials is derived from ANSI standards and aligned with them.[37] But not even all the big IT credentialing bodies follow the institute's prescribed regimen – it's that burdensome. According to Roy Swift, ANSI's highly respected chief workforce development officer, less than 10 percent of the industry certifications being awarded in the U.S. today are accredited by any organization, less than 2 percent by ANSI.[38] And as non-degree credentials have proliferated, Swift and others in the field have begun to talk about the possibility of a less stringent form of recognition that, as he puts it, "would meet people where they are and try to move them to a higher level" – some kind of intermediate step on the way to accreditation.[39]

Meanwhile, the foundations interested in industry credentialing have funded several initiatives to explore alternative methods of quality control. One group of large national trade associations in sectors projected to generate 75 percent of U.S. job growth in the next five years is recommending a process for developing credentials that closely resembles what ANSI demands – but perhaps less exacting.[40] Still another group, based at George Washington University and involving many of the same players, is working on a different, overlapping project.[41] This initiative, which one of the scholars involved compares to a 21st century e-version of *Consumer Reports*, would analyze and translate credentials into standardized descriptive terms, then post the descriptions on an open electronic registry available to employers, educators and others – a kind of virtual marketplace.

An alternative approach, different in kind from all these efforts to oversee process and evaluate quality, would rely on data about outcomes – credential holders' success in the labor market. Are trainees with industry certifications more likely to get jobs than workers

without credentials? Do they get jobs in the fields in which they're certified? Do they earn more? Astonishingly, even after 20 years of competency-based credentialing, very little is known about labor market outcomes.

What is known draws largely on unreliable or incomplete information: anecdotes, surveys, efforts to count how often industry credentials are mentioned in want ads and the like. IT credentialing bodies and others do extensive surveying of IT workers, but those who hold credentials and are working in the field are much more likely to respond to questions about credentialing, skewing survey results.[42] The Census SIPP survey asked about labor market returns and found that people working full-time with alternative credentials – licenses and certifications – earned more across the board than people without credentials. The typical wage premium for those with less than a bachelor's degree: 13 to 26 percent.[43] The problem: the Bureau did not separate the return to occupational licenses from the return to certification – making it difficult to ascertain anything about the return to certification.

A more reliable method of assessing outcomes would match information about who earns what credentials with government data about employment and earnings. A number of obstacles stand in the way of this kind of matching: privacy concerns, legal issues, who owns the data and anxiety about federal interference in education, among others. But education reformers determined to assess the value of non-degree credentials are beginning to break through these barriers.

Most of the successful efforts so far match trainee information with wage record data reported by employers to the state agencies that manage unemployment insurance. In one promising pilot project in Illinois, CompTIA, the Illinois community college system and the state agency responsible for unemployment insurance shared information about 3400 students who took CompTIA certification tests between 2005 and 2010.[44] What the study found: those who passed the test were only slightly more likely to have a job – 61 percent were employed compared to 57 percent of those without certifications. But their median quarterly earnings were dramatically higher: about one third higher within three months of the day they sat for the exam and almost 1.5 times higher nine months later. Bottom line: certified students had better outcomes to begin with, and the gap widened with time.

Still another interesting project, spearheaded by officials from California and North Carolina, involves government agencies and community college administrators from some 20 states.[45] Their pilot will match test results from NIMS and several other credentialing bodies with community college transcripts and wage record data from California, North Carolina and Virginia. Results are expected soon, then the project will expand to include other states. The ultimate goal: a national repository of data about labor market returns to industry credentials and the courses that prepare students for them.

Meanwhile, at the federal level, educators and others are looking for ways to get access to federal records of credential holders' earnings and employment.[46] One of the most promising: legislation introduced in 2013 by a strange-bedfellow pair of liberal and conservative Senators, Democrat Ron Wyden of Oregon and Republican Marco Rubio of Florida.[47] Like the California and North Carolina project, the "Student Right to Know Before

You Go Act" would create a single, national reporting site that collects data on educational outcomes, including non-degree credentials – but rather than rely on spotty state wage records, it would use earnings data from the Social Security Administration.

Which one of these projects is most likely to succeed in taming the Wild West of alternative credentialing? The answer will surely be some combination – perhaps all of the above. There's no substitute for bottom-up employer-driven confirmation that credentials certify needed skills – skills actually in demand in the workplace. But there's also no gainsaying data about labor market outcomes – no better way to measure the real value of a credential. The one thing most reformers hopeful about certification seem to agree on: the system shouldn't be run or regulated by the federal government. Standards are essential, so is transparency. But the measure that counts in this case is the skills employers want and need in employees – and the government can't assess that. Only an employer-driven process can.

What Alternative Credentials Mean for K-12 Educators

What does this new vogue mean for conventional educators? How will the changes wrought by alternative credentialing affect ordinary high schools and colleges and the students who attend them? At first blush, the new credentials may seem irrelevant to most teachers: an alternative path or parallel universe, helpful perhaps for some struggling students but with little bearing for the vast majority of young people going to class, earning traditional credentials and focused on exceling the old-fashioned way – academically. These skeptics couldn't be more wrong. Alternative credentialing is already making inroads at thousands of conventional schools – high schools and colleges. Many more students than most teachers imagine are drawn to the prospect of job-oriented education and training where they learn skills on demand in the workplace – and schools should be helping them find career paths that suit them. Perhaps most important, the big new ideas behind alternative credentialing are already driving change at many traditional schools, secondary and postsecondary. Just look around – the revolution has already begun.

Industry-driven credentialing bodies like NIMS and CompTIA don't care where students prepare for their tests, and both have relationships with scores of high schools as well as community colleges and voc-tech centers. High school courses teaching to technical certification tests are usually electives. The teachers generally come up out of the school system, but often get training and certification from a national credentialing body. Students earn credit toward their high school diplomas, but they also earn an industry credential that can open a door to a job. And in many schools, the industry award is worth credit at a local community college – the technical equivalent of Advanced Placement.

The big advantage for students is to get an early start on a career path that can carry them through the transition from school to work – a perilous passage for many teenagers. A kid who gets excited about, say, metalworking in high school is not only less likely to drop out of high school, he now has a reason to go on for more schooling – and a clear path to follow to the next level and beyond.

Lake Brantley High School in Altamonte Springs, FL has a fairly typical program that demonstrates how credentialing can work in high school. Altamonte Springs is a suburban enclave just north of Orlando, and Brantley Lake is a nationally recognized, award-winning school. It complements its rich academic offerings with a career and technical education division that prepares students for 16 industry certifications – CompTIA, Microsoft, Cisco, Apple and nationally recognized first-rung tests in nursing, accounting, architecture, engineering and basic construction skills. Students who complete Brantley Lake CTE courses are eligible to take college-level assessment tests. If they pass and then enroll in nearby Seminole State College, they receive credit toward a technical certificate or an associate of science degree.[48] This overlap, called dual enrollment, saves students both time and money. Students who study computer programing at Brantley Lake can earn up to nine credits worth $939, those who take allied health courses can earn 12 credits worth $1252.

Next step: a student who then pursues, say, nursing at Seminole State can earn not just an associate's degree, but also concurrent credit toward a bachelor's degree at the University of Central Florida. This too saves time and money – and puts the student on a guided path that can make it much easier for many to keep going. Other certifications available at Brantley Lake open the door to internships, apprenticeships and industry-sponsored craft training. Still other students may use their industry credential to head straight for the job market, but then after a few years come back for more schooling, whether at a community college or other training center that recognizes their certification. What makes this work are the stackable, bite-sized pieces: relatively short learning modules validated by non-degree credentials – and the best time to start on a path is often in high school. For kids who know where they're going, it's a head start. For those who have reached high school without a clue, it can be a new lease on life.

This needn't involve tracking. On the contrary: it's about choices – and the challenge for K-12 educators is to keep choices open, all the way from kindergarten through graduation. As is, most students have few if any choices. Most schools are single-mindedly focused on academic achievement. Most counselors neglect or actively denigrate potential alternatives to college. Students get little exposure to the world of work. And the only second track open to many – other than academics – is failure. This failure shows up first in high school dropout rates and then again later in life. According to a recent ACT survey, 80 percent of students who sit for the organization's standardized readiness test aspire to earn a bachelor's degree or higher, while only 6 percent are aiming for an associate's degree or technical certificate.[49] According to another study, even among high school seniors in the bottom quarter of their class, more than 90 percent expect to go to college.[50] But the fact is only four in 10 Americans graduate from college – so the system is failing 60 percent of students.

Surely it makes sense to offer some other options. For K-12 students, this means mostly exposure. It can start as early as elementary school: field trips to a range of workplaces, including technical workplaces. For middle school kids, there's job shadowing; for high school students, internships. Hundreds of trade associations and professional societies offer mentoring programs, summer camps, co-op jobs, practicums and other introductory programs designed to expose students to a practical field and interest them in future

careers. Annual skills competitions – in IT, construction, culinary arts and host of other trades – whet students' appetites and give them a sense of accomplishment. Courses like "tape measure math" – students learn about fractions from a ruler or a measuring tape – can help technically minded young people excel and also discover what interests them. Counseling is key. Perhaps the most important imperative in an elementary or high school setting is to do no harm: to avoid disparaging practical or technical work and stop sending the signal that the only success that counts is academic. What educators need to remember: this isn't an either/or. A student who does well in high school because a course in computer networking – or nursing or welding or metalworking – finally grabbed his interest may go on to college and eventually professional school.

Transforming College as We Know It

Industry-driven credentials are putting the dignity back in technical work, but that's not the only way they are changing American education – and not just in vocational or technical programs. The principles behind non-degree credentialing are already catching on at a broad array of colleges. Small stackable units, education to prepare students for jobs, credit given for demonstrated learning rather than time spent in class: this is the cutting edge of new thinking about postsecondary education. The evidence is everywhere: from prior learning assessments that allow veterans to earn college credit for what they did in the military to learning portfolios for mid-career professionals going back to school to get that degree they skipped, from Mozilla Open Badges validating work experience and extracurricular skills to the popularity of the best for-profit colleges, which focus unabashedly on preparing students for the world of work. But perhaps the most exciting example is what's happening at Western Governors University, the only college in the country where the learning is entirely competency-based.

Established less than two decades ago by a group of governors concerned that American colleges weren't preparing the workforce of the future, WGU now serves some 38,000 students in 50 states.[51] All courses are on online. Students work from wherever they live and do not meet a teacher or a counselor in person until graduation day. Degrees are concentrated in four disciplines that lead directly to jobs: business, IT, teaching and the health professions. The average tuition is $15,000, about half the price of a typical public college. And the average student gets a bachelor's degree in just 2.5 years, about half what it takes most students at conventional four-year schools.

WGU is a nontraditional student's dream: affordable, flexible, targeted, quick – a fast track to a job or a better job. And by all accounts, it's an excellent education. WGU seniors scored better than students from 124 out of 155 other colleges who sat for the national Collegiate Learning Assessment test in 2013. A 2013 survey of employers found that 96 percent felt WGU graduates exceeded their expectations – and 98 percent would hire another WGU grad. WGU students also scored high on the 2013 National Study of Student Engagement: they take more challenging coursework than students at many other schools and study longer hours, despite the fact that they work from home and speak to teachers only on the telephone.[52]

There is so much innovation at WGU that it can be hard to know where to start in explaining its success. But the core idea is the same core idea that drives non-degree industry credentials: identify the skills that students need on the job, then help them learn those skills the most efficient way, focusing on and measuring what they learn rather than who they learn it from or how long it takes them.

A student begins her career at WGU with a high-stakes assessment test. The result determines where she starts on a series of modules that lead to a degree. Some students begin at the beginning of the series, others place out of much or most of it. (Industry credentials can also help you skip ahead.) Students proceed through online courses at their own pace: one may struggle to complete three credits in a semester, while another aces 10 or 20 courses. There is no full-time faculty, but each student has a personal mentor, who they speak to at least once a week, and every course comes with access to subject matter experts who are also available electronically.

Many WGU courses require a performance-based assessment as well as a written test. After all, these are practical subjects – and the test that matters most may be proving you can write a computer program or craft a business plan or insert a tube in a dummy in a nursing simulation lab. Often, this assessment is the same test required for an industry credential, and many WGU students graduate with industry certifications alongside their degrees. Indeed, the methods pioneered by industry credentials are everywhere in evidence at WGU, from a strict separation of instruction and assessment to the design of the curriculum. Like industry certifications, WGU degree programs are built around competencies required on the job – and university administrators work with industry representatives to identify these competencies in a deliberative process much like the process behind NIMS and CompTIA credentials.

WGU president Robert Mendenhall makes an important distinction between industry certifications and the education offered at WGU. "We're not in the business of mini-credentialing," he explains. "We're a university, and our students come away with a full, well-rounded education – the skills they need for life."[53] But this is a comment about the breadth of learning required for a WGU degree, not a repudiation of the principle of job-focused, competency-based education. For Mendenhall and others at WGU, there's little contradiction and no need to choose – no tension between purpose-driven training and a well-rounded education that teaches students essential skills like critical thinking and problem-solving. Western Governors University proves the point: there's no reason a well-designed practical course can't also teach broader skills.

Two Roads Ahead

For every reformer hopeful about non-degree credentials, there's a skeptic who looks down on them – as narrow or unworthy or anti-intellectual, or even a dangerous distraction from traditional higher education. One of the skeptics' most chilling warnings: that like old-fashioned vocational education, non-degree credentials will give rise to a parallel, alternative track – with less prestige, inferior teaching and lower expectations for students.[54] And they're not wrong – there's clearly a danger of that. But change could also

go the other way. Today, the gold standard is a degree – every young person wants a college degree. But this preference could shift as non-degree credentials evolve. If and when they prove they can open the same doors, or possibly more, and earn the same return, or possibly better, and point the way to a potentially more flexible, rewarding future of lifelong learning – why couldn't alternative credentials earn as much respect as degrees? Non-degree credentialing is already starting to take the stigma out of practical, job-oriented training. What's wrong, after all, with learning a skill that gets you a job? Surely that's why most people go to college in the first place.

[1] Daniel Gamez, interview by author, San Antonio, TX, August 8, 2014.

[2] Gretchen Koch, executive director of workforce development at CompTIA, and Steven Ostrowski, director of corporate communications at CompTIA, telephonic interview by author, August 13, 2014.

[3] "Top IT Certifications for 2014," *The Night Owl Blog*, Western Governors University, March 7, 2014, http://www.wgu.edu/blogpost/top-it-certifications-2014 (accessed September 10, 2014).
[4] U.S. Department of Commerce, Census Bureau, *Measuring Alternative Educational Credentials: 2012*, by Stephanie Ewert and Robert Kominski (N.p.: U.S. Census Bureau, January 2014), http://www.census.gov/prod/2014pubs/p70-138.pdf (accessed September 8, 2014).

[5] The White House, *Ready to Work: Job-Driven Training and American Opportunity*, by Joe Biden (Washington, D.C.: The White House, July 2014), http://www.whitehouse.gov/sites/default/files/docs/skills_report.pdf (accessed September 15, 2014);
Marco Rubio, "Making Higher Education Affordable Again" (speech, Miami, FL, February 10, 2014), Marco Rubio United States Senator for Florida, http://www.rubio.senate.gov/public/index.cfm/2014/2/rubio-proposes-ideas-for-higher-education-reform-at-miami-dade-college (accessed September 8, 2014).

[6] U.S. Department of Labor, Bureau of Labor Statistics, *The Employment Situation – August 2014*, USDL-14-1642 (N.p.: U.S. Bureau of Labor Statistics, September 5, 2014), http://www.bls.gov/news.release/empsit.nr0.htm (accessed September 8, 2014);
U.S. Department of Labor, Bureau of Labor Statistics, *Job Openings and Labor Turnover – July 2014*, USDL-14-1672 (N.p.: U.S. Bureau of Labor Statistics, August 12, 2014), http://www.bls.gov/news.release/pdf/jolts.pdf (accessed September 11, 2014).

[7] Harry J. Holzer and Robert I. Lerman, *The Future of Middle-Skill Jobs* (Washington, D.C.: Brookings Institution, Center on Children and Families, February 2009), http://www.brookings.edu/~/media/research/files/papers/2009/2/middle%20skill%20jobs%20holzer/02_middle_skill_jobs_holzer.pdf (accessed September 8, 2014);
Anthony Carnevale, Nicole Smith and Jeff Strohl, *Help Wanted: Projections of Jobs and Education Requirements Through 2018* (Washington, D.C.: Georgetown University Center on Education and the Workforce, June 2010), https://georgetown.app.box.com/s/ursjbxaym2np1v8mgrv7 (accessed September 10, 2014).

[8] U.S. Department of Education, National Center for Education Statistics, *Digest of Education Statistics 2012*, by Thomas D. Snyder and Sally A. Dillow, NCES 2014-015 (Washington, D.C.: National Center for Education Statistics, December 2013), http://nces.ed.gov/pubs2014/2014015.pdf (accessed September 12, 2014).

[9] U.S. Department of Education, National Center for Education Statistics, "Part Time Undergraduates in Postsecondary Education: 2003-2004," *Postsecondary Education Descriptive Analysis Report*, by Xianglei Chen and C. Dennis Carroll, NCES 2007-165 (Jessup, MD: Education Publications Center, June 2007), http://nces.ed.gov/pubs2007/2007165.pdf (accessed September 16, 2014).

[10] National Center for Education Statistics, *Digest of Education Statistics 2012*.

[11] U.S. Department of Education, National Center for Education Statistics, *Digest of Education 2010*, by Thomas D. Snyder and Sally A. Dillow, NCES 2011-015 (Washington, D.C.: National Center for Education Statistics, April 2011), http://nces.ed.gov/programs/digest/d10/tables/dt10_240.asp (accessed September 15, 2014).

[12] Jean Johnson and Jon Rochkind, *With Their Whole Lives Ahead of Them: Myths and Realities About Why So Many Students Fail to Finish College* (New York, NY: Public Agenda, 2011), http://www.publicagenda.org/files/theirwholelivesaheadofthem.pdf (accessed September 10, 2014).

[13] Anthony Carnevale, Tamara Jayasundara and Andrew Hanson, *Career and Technical Education: Five Ways That Pay Along the Way the Way to the B.A.* (Washington, D.C.: Georgetown University Center on Education and the Workforce, September 2012), https://georgetown.app.box.com/s/jd4r0nwvjtq12g1olx8v (accessed September 11, 2014).

[14] U.S. Department of Education, National Center for Education Statistics, *Enrollment in Postsecondary Institutions, Fall 2011; Financial Statistics, Fiscal Year 2011; and Graduation Rates, Selected Cohorts, 2003-2008: First Look (Provisional Data)*, by Laura G. Knapp, Janice E. Kelly-Reid and Scott A. Ginder, NCES 2012-174rev (Washington, D.C.: National Center for Education Statistics, December 2012), http://nces.ed.gov/pubs2012/2012174rev.pdf (accessed September 12, 2014).

[15] Amy Laitinen, *Cracking the Credit Hour* (Washington, D.C.: New America Foundation, September 2012), http://higheredwatch.newamerica.net/sites/newamerica.net/files/policydocs/Cracking_the_Credit_Hour_Sept5_0.pdf (accessed September 12, 2014).

[16] ACT, *National Collegiate Retention and Persistence to Degree Rates* (Iowa City, IA: ACT, 2014), http://www.act.org/research/policymakers/pdf/retain_2014.pdf (accessed September 11, 2014).

[17] U.S. Department of Commerce, Census Bureau, *2010 American Community Survey*, as calculated by Lumina Foundation (March 2012), http://www.luminafoundation.org/publications/A_stronger_nation_through_higher_education.pdf (accessed September 22, 2014).

[18] Census Bureau*, Measuring Alternative Educational Credentials: 2012*; "What is a Credential?," Association for Career and Technical Education, accessed September 12, 2014, www.acteonline.org/WorkArea/DownloadAsset.aspx?id=1917.

[19] Carnevale, Jayasundara and Hanson, *Career and Technical Education: Five Ways That Pay Along the Way the Way to the B.A.;*
 U.S. Department of Education, National Center for Education Statistics, *The Condition of Education 2014*, by Grace Kena et al., NCES 2014-083 (N.p.: National Center for Education Statistics, May 2014), http://nces.ed.gov/pubs2014/2014083.pdf (accessed September 11, 2014).

[20] U.S. Department of Commerce, Census Bureau, *Survey of Income and Program Participation 2008*, Panel Wave 13 (N.p.: U.S. Census Bureau, 2012), http://www.census.gov/programs-surveys/sipp/data/2008-panel/wave-13.html (accessed September 12, 2014);
Census Bureau, *Measuring Alternative Educational Credentials: 2012*.

[21] Morris M. Kleiner and Alan B. Krueger, "Analyzing the Extent and Influence of Occupational Licensing on the Labor Market," *Journal of Labor Economics* 31.2 pt. 2 (April 2013): S173-S202, http://www.hhh.umn.edu/people/mkleiner/pdf/Final.occ.licensing.JOLE.pdf (accessed September 11, 2014).

[22] Census Bureau, *Measuring Alternative Educational Credentials: 2012*.

[23] James A. Wall, executive director at NIMS, Melanie Stover, director of strategic initiatives at NIMS, and Jacey Wilkins, communications consultant at NIMS, interview by author, Fairfax, VA, August 8, 2014.

[24] Gardner Carrick, vice president of strategic initiatives at the Manufacturing Institute, interview by author, Washington, D.C., July 21, 2014;
U.S. Department of Labor, Bureau of Labor Statistics, *Occupational Outlook Handbook 2014-2015 edition,* Machinists and Tool and Die Makers, (N.p.: Bureau of Labor Statistics, January 2014), http://www.bls.gov/ooh/production/machinists-and-tool-and-die-makers.htm#tab-5 (accessed September 15, 2014).

[25] James A. Wall, executive director at NIMS, interview by author, Fairfax, VA, August 8, 2014.

[26] Carrick, interview.

[27] Wall, interview.

[28] Koch and Ostrowski, interview.

[29] "About New Horizons," New Horizons, accessed September 12, 2014, http://www.newhorizons.com/aboutnewhorizons.aspx.

[30] "About Pearson VUE," Pearson VUE, accessed September 12, 2014, http://www.pearsonvue.com/about/.

[31] Ed Tittel, "Weighing the '800-lb Gorillas' of IT Certification," *Tom's IT Pro*, October 30, 2012, http://www.tomsitpro.com/articles/IT_Training-CCNA-MCSE-GoCertify-CompTIA,2-401.html (accessed September 12, 2014).

[32] U.S. Department of Education, Office of Educational Research and Improvement, *A Parallel Postsecondary Universe: The Certification System in Information Technology*, by Clifford Adelman (Jessup, MD: Education Publications Center, October 2000), http://www.edpubs.gov/document/ed001454p.pdf?ck=70 (accessed September 12, 2014).

[33] Amy Laitinen, comments at "Skills Beyond School," (New America Foundation, Education Policy Program and OECD event, Washington, D.C., July 10, 2013).

[34] Wall, interview.

[35] Roy Swift, chief workforce development officer at ANSI, interview by author, Washington, D.C., July 23, 2014;
Emily DeRocco, strategic advisor at ACT Foundation, interview by author, Washington, D.C., July 28, 2014;
Stephen Crawford, research professor at the George Washington Institute of Public
Policy at George Washington University, telephonic interview by author, August 19, 2014;
Jane Oates, vice president of external affairs at Apollo Education Group, interview by author, Washington, D.C., July 23, 2014;
Carrick, interview;
Matthew Meyer, associate vice president of STEM innovations at North Carolina Community College System, telephonic interview by author, August 20, 2014.

[36] International Organization for Standardization, *Conformity assessment — General requirements for accreditation bodies accrediting conformity assessment bodies*, ISO/IEC 17011 (Switzerland: International Organization for Standardization, September 1, 2005), http://igs.nigc.ir/naft/STANDARD/IEC-17011.pdf (accessed September 12, 2014);
ASTM Standard E2659-09, "Standard Practice for Certificate Programs," (West Conshohocken, PA: ASTM International, 2009).

[37] Koch and Ostrowski, interview;
Wall, Stover and Wilkins, interview.

[38] Swift, interview.

[39] Ibid.;
Oates, interview;
Carrick, interview.

[40] DeRocco, interview;
"Connecting business to working learners," ACT Foundation, accessed September 12, 2014,
http://actfdn.org/what-we-do/optimize-solutions/national-network-business-industry-associations/.

[41] Crawford, interview.

[42] Greg Timpany, *2014 IT Skills & Salary Report: A Comprehensive Survey from Global Knowledge and Windows IT Pro*, Global Knowledge (2014),
http://www.peoplecert.org/en/presscenter/Press_Releases/Documents/2014-Salary-Report-GlobalKnowledge-WindowsITpro.pdf (accessed September 12, 2014).

[43] Census Bureau*, Measuring Alternative Educational Credentials: 2012*.

[44] Koch and Ostrowski, interview;
Gretchen Koch and Scott J. Parke, *CompTIA and Illinois Industry Certification Data Sharing Pilot Project*, CompTIA (January 2013),
http://cte.ed.gov/dqi/app/webroot/files/S8A_2013_DQI_Data_Sharing_Pilot_January_2013_Update.pdf (accessed September 12, 2014);
Michelle Massie, *Credential Data Pioneers: Forging new partnerships to measure certifications and licenses* (Washington, D.C.: Workforce Data Quality Campaign, April 2014),
http://www.workforcedqc.org/sites/default/files/images/WDQC%20Credentials%20Paper%20April%202014.pdf (accessed September 14, 2014).

[45] Meyer, interview;
Massie, *Credential Data Pioneers.*

[46] Clare McCann and Amy Laitinen, *College Blackout: How the Higher Education Lobby Fought to Keep Students in the Dark* (Washington, D.C.: New America Education Policy Program, March 2014),
http://newamerica.net/sites/newamerica.net/files/policydocs/CollegeBlackoutFINAL.pdf (accessed September 12, 2014);
Carnevale, Jayasundara and Hanson, *Career and Technical Education: Five Ways That Pay Along the Way the Way to the B.A.*

[47] *Student Right to Know Before You Go Act of 2013*, S. 915, 113th Cong., 1st sess., *Congressional Record* 159 (May 9, 2013): S 3326. http://www.gpo.gov/fdsys/pkg/BILLS-113s915is/pdf/BILLS-113s915is.pdf (accessed September 10, 2014).

[48] Mike Gaudreau, *Curriculum Guide 2014-2015*, Lake Brantley High School (Altamonte Springs, FL: 2014),
http://lakebrantley.com/Portals/105/assets/pdf/Guidance%20pdf/LBHS%20Curriculum%20Guide%202014-2015%20REVISED%202-21-14.pdf (accessed September 15, 2014);
Cheryl Cicotti, associate dean of nursing at Seminole State College, interview by author, Sanford, FL, June 3, 2014.

[49] Mark Schneider, "2014 ACT Reports: Mismatch between College Aspiration and Preparation," *The Quick & the Ed*, American Institutes for Research, August 21, 2014, http://www.quickanded.com/2014/08/2014-act-reports-mismatch-between-college-aspiration-and-preparation.html (accessed September 15, 2014).

[50] James E. Rosenbaum, *Beyond College for All: Career Paths for the Forgotten Half* (New York: Russell Sage Foundation, 2001).

[51] Robert Mendenhall, president of Western Governors University, telephonic interview by author, August 4, 2014;
The White House, *Ready to Work: Job-Driven Training and American Opportunity*

[52] "WGU Student and Graduate Success," Western Governors University, accessed September 15, 2014, http://www.wgu.edu/about_WGU/graduate_success.

[53] Mendenhall, interview.

[54] Sophie Quinton, "What Rubio Got Wrong about College Accreditation," *National Journal*, February 17, 2014, http://www.nationaljournal.com/next-america/education/what-rubio-got-wrong-about-college-accreditation-20140217 (accessed September 15, 2014).