OPPORTUNITYAMERICA

INDUSTRY CERTIFICATIONS

A BETTER BRIDGE FROM SCHOOL TO WORK?

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SEPTEMBER 2019

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ABOUT THE AUTHOR

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ABOUT THE ORGANIZATION

Opportunity America is a Washington-based nonprofit promoting economic mobility—work, skills, careers, ownership and entrepreneurship for poor and working Americans. The organization's principal activities are research, policy development, dissemination of policy ideas and working to build consensus around policy proposals.

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EXECUTIVE SUMMARY

Postsecondary education and training are changing, shifting out from under many Americans' idealized image of college. Many fewer postsecondary learners than in the past are recent high school graduates. Many more work while in college. A growing number have families, and a shrinking share live or study on a campus. Perhaps least well understood but most significant for the labor market, a smaller share are aiming for or likely to earn bachelor's degrees.

What many seek instead: shorter, more job-focused credentials. Credit-bearing academic certificates, commonly awarded after a year of study or less, have grown significantly more popular in recent decades. More students now earn short-term certificates or associate degrees than bachelor's degrees. But recent years have also brought a burst of new credentialing issued by noncollege education and training providers. Among the most intriguing are industry-driven certifications—promising because of their unique potential to connect students to the labor market.

Unlike traditional academic awards, which signal that students have attended and completed a course of study, industry certifications aim to signal what learners know and what job-related tasks they can perform—occupation-specific knowledge and skills measured by standardized tests, generally developed by employers.

The key element is the tests—some on paper, others performance-based. A growing number of high school and college programs prepare students to sit for these assessments. But the tests themselves are usually administered by an independent third party, and the credential is issued by the industry group, not the academic institution.

We interviewed two dozen employers, some of whom rely on certifications when hiring and promoting and some who do not.

What industry certifications promise students: to provide a better bridge between what they learn in class and the skills they need to succeed on the job. Instead of traditional academic subjects that may or may not be relevant in the world of work, students study topics and sharpen skills specified by potential employers.

The promise to employers: that industry credentials will take the guesswork out of hiring. It doesn't matter where students learned—high school, college, on the job or elsewhere. All are held to the same standard and, in theory, come to work equally qualified.

Taken together, it's a heady promise, but many questions remain. Do certifications capture the skills they claim to capture? Do they predict success on the job? Are certified workers more likely to be hired or promoted? Do they earn more?

This study begins to explore these unknowns by examining employer uptake of industry certifications.

We focus on three industries that hire primarily workers without bachelor's degrees: construction, manufacturing and automotive maintenance and repair.

Each is served by a well-established credentialing body: the National Center for Construction Education and Research (NCCER), the National Institute for Metalworking Skills (NIMS) and the National Institute for Automotive Service Excellence (ASE). All three types of certifications are embedded in high school and college programs across the US, and all are relatively well-known to employers in their industries.

Within these three sectors, we interviewed two dozen employers, large and small, some of whom rely on certifications when hiring and promoting and some who do not. It's a small sample, hardly representative. But we believe it provides a window on the use of certifications and their value to employers and employees.

Findings

Among our key findings:

- The employers who rely most heavily on certifications are often larger companies or firms more concerned about their reputations, frequently in sectors where external pressures play a bigger role in business decisions.

- A common explanation offered by employers who do not look to certifications as a hiring tool: they rarely encounter certified job applicants.

- Many firms would like to require that new hires be certified and would insist if that were practical—if there were a robust supply of certified workers looking for jobs in their area. Instead, they look to credentialing as a plus factor when considering job applicants.

- Certifications aren't probative or foolproof. Much like a college degree, certification is a proxy—evidence that the credential holder has made an effort or completed a program of study. But it can be difficult for even the best assessments to capture experience or hands-on expertise.

- As important as hiring for many of the employers we interviewed, industry credentialing provides a framework to guide training and promotion of skilled employees.

- Used properly, certification can upgrade jobs across an industry, establishing benchmarks, standardizing skills and creating more predictable career ladders.

- The employers we interviewed who look to certifications when hiring and promoting workers seemed confident that the credentials they rely on reflect skills in demand in their industry. Most are also convinced that their sector's credentialing body stays up to date, keeping abreast of market trends and changing technology.

- Asked for proof of ROI, the employers in our sample could provide no verifiable data on the value of industry credentialing. Most of what they offered was anecdotal evidence. Yet several maintained that actions speak louder than words: their company would not be promoting and paying people on the basis of tests that had no proven payoff for the firm.

Recommendations for policy

Will industry certification live up to its potential as a better bridge from school to work? It's too soon to tell. This paper draws on two dozen company site visits and interviews with employers to recommend some next steps—what employers, educators, job seekers, certifying bodies and policymakers can do to improve industry credentialing and encourage broader use.

Refining the tool. Many of the employers we interviewed, users and nonusers, had suggestions about improving the credentials in their industry. Most important to them and all but universal in our sample: employers want the certifications on offer in their sector to do a better job of validating hands-on skill—not just theoretical knowledge or a project completed for a test, but actual performance on the job.

This is a task that falls primarily to certifying bodies—NIMS, ASE, NCCER and others. But industry stakeholders and policymakers can also make a difference. In our experience, industry credentialing bodies are sharply attuned to demand from employers in the sector they represent.

Encouraging broader use. The employers we interviewed left little doubt: if more job applicants had certifications, many more companies in all three industries would rely on them to make decisions about hiring. It's a version of the network effect, as true of certifications as of social media: a larger number of users enhances the value of the network.

There's also a reinforcing loop. If employers saw more job seekers with certifications, firms would be more inclined to ask for them in job postings. And if job seekers knew that companies were likely to request credentials, students would be more inclined to take and pass credentialing tests.

Employers, educators and policymakers can all make a difference in this realm, mentioning certifications in job postings, incorporating in-demand certifications in high school and college programs and ensuring that policy, state and federal, keeps up with employer demand for industry credentialing.

Quality control. Perhaps most important, the biggest challenge to broader use and wider acceptance of industry credentialing is quality assurance. Do certifications reflect skills in demand in the labor market? Do they lead to better employment outcomes—do certified workers land better jobs and earn higher wages? We don't know—and will be unable to determine until we find better ways to collect and compare data.

This too must be a joint effort. Credentialing bodies, educators and state and federal government all have a role to play in collecting information and making it available. The most reliable way to assess the value of credentialing: matching data about certified workers with data about labor market outcomes gathered from employers.

Taken together, the interviews that form the basis for this study tell an encouraging story. Employers in the three sectors we explored see competency-based credentials as an important tool. But even the best tool is only as good as the scaffolding around it: in this case, public awareness, marketing, broader uptake by employers, wider use among educators, a larger universe of certified job seekers, more extensive outcomes data and a system of standardized quality assurance.

INTRODUCTION

Postsecondary education and training are changing, shifting slowly but unmistakably out from under many Americans' idealized image of college. Many fewer postsecondary learners than in the past are recent high school graduates. Many more work while in college, either part time or full time. A growing number have families of their own. As online providers and noncollege training proliferates, a shrinking share of students live or study on a campus. Perhaps least well understood but most significant for the labor market, a smaller share are aiming for or likely to earn bachelor's degrees.

The trend toward shorter, more job-focused credentials isn't new. Associate degrees go back more than 100 years.[1] Credit-bearing academic certificates, commonly awarded after a year of study or less, have grown significantly more popular in recent decades—so much so that more students now earn academic certificates or associate degrees than bachelor's degrees.[2] But recent years have also brought a burst of new credentialing issued by noncollege education and training providers. Among the most intriguing are industry-driven certifications—promising because of their unique potential to connect students to the labor market.

Unlike traditional academic awards, which signal that students have attended and completed a course of study, industry certifications aim to signal what learners know and, often, what job-related tasks they can perform—occupation-specific knowledge and skills measured by standardized tests, generally developed by employers.

The key element is the tests—some on paper, others performance-based. A growing number of high school and college programs prepare students to sit for these assessments. But the tests themselves are usually administered by an independent third party, and the credential is issued by the industry group, not the academic institution. Certifications convey no information about where or how the learner prepared. They may or may not come with college credit. And they often need to be renewed every few years, demonstrating that those who hold them have the skills to succeed in a changing labor market.

What certifications promise students and teachers: to provide a better bridge between what students learn in class and the skills they need to succeed on the job. Instead of traditional academic subjects that may or may not be relevant in the world of work, students study topics and sharpen skills specified by potential employers. Instead of hewing year after year to old, shopworn curriculum that may or may not have currency in the labor market, educators design programs aligned with what employers say employees need to know.

The promise to employers: that industry credentials will take the guesswork out of hiring. They signal that students have focused on job-related instruction and passed a competency-based assessment, demonstrating knowledge and skills to a disinterested third party. Equally important, unlike college degrees,

The key element is the tests—some on paper, others performance-based.

which vary in value from program to program and institution to institution, industry certifications verify standardized skills deemed to be in demand nationwide. It doesn't matter where students learned—high school, college, on the job or elsewhere. All are held to the same standard and, in theory, come to work equally qualified.

Taken together, it's a heady promise, but many questions remain. Do certifications capture the skills they claim to capture? Do they predict success on the job? Are certified workers more likely to be hired or promoted? Do they earn more? Is industry credentialing making a difference bridging the gap between school and work?

Relatively little is known about any of these questions. Federal law—the Workforce Innovation and Opportunity Act (WIOA) and the Strengthening Career and Technical Education for the 21st Century Act (Perkins V)—encourages attainment of industry credentials. But the federal government keeps scant data on who earns certifications or their effects on learners' employment outcomes. Some states are starting to collect information, but credentialing bodies are under no obligation to report attainment or outcomes, and even the best state records are incomplete.

This study begins to explore the unknowns by examining employer uptake of industry certification.

We focus on three industries that hire primarily workers without bachelor's degrees: construction, manufacturing and automotive maintenance and repair. Each is served by a well-established credentialing body: the National Center for Construction Education and Research (NCCER), the National Institute for Metalworking Skills (NIMS) and the National Institute for Automotive Service Excellence (ASE). All three types of certifications are embedded in high school and college programs across the United States, and all are relatively well-known to employers in their industries.

Within these three sectors, we interviewed two dozen employers, large and small—at least six in each industry—some of whom rely on certifications when hiring and promoting and some who do not. It's a small sample, hardly representative. But we believe it provides a window on the use of certifications and their value to employers and employees.

The first section of the paper establishes the context for the study: the changing labor market that has given rise to alternative credentials, how industry certifications are earned, what is known about student uptake and growing interest from policymakers. The second section explores how three credentialing bodies—ASE, NCCER and NIMS—develop and maintain certifications. The third section looks at how the employers we interviewed make decisions about hiring and promotion—why they do and don't rely on industry credentialing and what value it offers those who do. The final section of the paper offers recommendations for policy.

CONTEXT

The economy is changing and with it, America's demand for labor. Information technology, the new speed of business, the new complexity of markets: all put a premium on education and skills—a more sophisticated, better prepared, more technically proficient labor force.

New tools for a new economy

A four-year college degree is still the best predictor of economic success. Nearly three-quarters of the jobs created in the years after the Great Recession went to workers with bachelor's degrees.[3] In 2017, college graduates were twice as likely to be employed as workers without degrees.[4] They earned, on average, 65 percent more.[5] A four-year degree remains an all but certain ticket to the middle class, and the line between college and noncollege is an ever more important social boundary—determining where and how Americans live, what they consume, even how they vote.

But only one-third of American adults hold bachelor's degrees.[6] Only 60 percent of those who enroll in college complete a degree within six years.[7] One fifth of the workforce—36 million adults—have some college but no degree.[8] And new technology is also transforming the career options available to these noncollege workers.

They face a complex labor market, unpredictable and difficult to navigate. There are fewer and fewer good jobs available for workers with only a high school diploma.[9] According to one estimate, middle-skill jobs—those requiring more than a high school diploma but less than a four-year degree—still account for more than half the labor force, and they will likely drive between one-third and one-half of demand in years ahead.[10]

Only one-third of American adults hold bachelor's degrees.

But middle-skill jobs vary widely, with some offering significantly more opportunity than others.[11] Some sectors are growing, others shrinking. Traditional blue-collar jobs are giving way to more highly skilled, more technical positions. And middle-skill workers, too, need postsecondary education or training to prepare them for well-paying jobs.

A multitude of new education and training options is emerging to meet this need—online, on the job and elsewhere. Traditional institutions—particularly community colleges—are rethinking their offerings.[12] An array of new, alternative credentials is available.[13] But this new training marketplace is far from settled, and few would argue it is working effectively to connect workers with open jobs.

How do students, college-age and older, identify which skills are in demand in the labor market? How do employers discern if applicants have the skills they need to succeed on the job? How should educational institutions decide what training to offer? All three groups lack the knowledge they need to make informed decisions. And it's no accident that employers in a wide range of industries complain they can't find workers or that those they hire lack required skills.

The problem is less about labor shortages than skill mismatches. Education and training aren't keeping up with the changing economy in large part because the signaling system that should connect education to careers isn't functioning as it should.

Students don't know what courses to take or which credentials to aim for. Employers don't know who to hire and sometimes hesitate to hire at all because they aren't sure who can do the job.[14] Despite a welter of new, alternative credentialing, we still lack the tools to bridge the gap between school and work. And the costs are mounting—for students, workers, employers and the economy.

Certification development and uptake

Postsecondary credentials come in all shapes and sizes. Traditional awards issued by educational institutions signal that students have completed academic programs. Learners attended class, fulfilled assignments and met teachers' requirements. Other awards, including licenses and certifications, are competency-based. Students may or may not have put in time in a classroom; what matters is that they have passed a test—sometimes written, sometimes performance-based—demonstrating mastery of the subject.

The difference between licenses and certifications: who grants the credential. Occupational licensure is generally issued by a state agency, designed in theory to protect consumers. Certifications are developed by employers or employer groups—usually employers seeking to upgrade the skills of workers in their industry. (See the glossary on the facing page.)

Industry credentialing is a relatively new tool. The first certifying bodies emerged in the 1970s, but the practice took off in earnest in the 1990s, when computer manufacturers and software companies began developing credentials. Today, according to one estimate, more than 5,000 employers and employer groups issue occupational certifications, and the list is growing as new industries discover their potential.[15]

Test development. Certifications vary widely in scope and quality, but many industry bodies follow similar procedures in developing credentials. An industry association canvasses employers from across the sector to create one or more job profiles—detailed lists of the skills workers need, occupation by occupation and job by job. The industry group then translates these job profiles, sometimes called "skills standards," into assessments—sometimes written, sometimes performance-based. Tests are generally scrutinized by psychometricians, then beta tested with employers. And most certifying bodies update their credentials—reviewing skills standards and revamping tests—on a regular, multiyear cycle.

How students prepare. Many certifying bodies cooperate with high schools and colleges that offer programs geared to their assessments. But few depend on educational institutions. Indeed, most make a point of their independence.

Some learners prepare for industry tests at secondary or postsecondary institutions. Some schools integrate certifications into course offerings—they teach to the test or use it as an end-of-course exam. Other institutions confer academic credit for industry credentials earned. But many learners prepare on their own time, on the job or by studying material available on the internet. And wherever students learn, certification tests must be administered by a third party—an independent testing center, designated employer volunteers or someone at the educational institution other than the instructor.

Who earns certifications. In the absence of better data, it's difficult to assess the prevalence of industry certifications. Adding to the challenge, although licensure is far more common than certification, because of the lack of data, all but a few researchers have treated them as a single category.

According to a 2014 analysis by the US Census Bureau, one-quarter of adults hold a postsecondary certificate, industry certification or professional license.[16] Another, somewhat more recent estimate suggests that one-quarter of employed adults hold a license or certification.[17] The 2014 Census study

NONDEGREE CREDENTIALS

Credential. An overarching term that encompasses a broad range of awards—academic degrees and certificates, state-issued licensure, government-issued certificates of apprenticeship and industry certifications, among others.

Certificate. Awarded by an educational institution on completion of a course of study. Requires attendance at the institution and seat time in class. Generally shorter than a degree—many certificates can be completed in a year or less—and more occupationally focused. Does not need to be renewed with continued training or periodic exams.

Licensure. Issued by government agencies, usually a state or municipality. Grants legal permission to perform an occupation in that jurisdiction. Competency-based, with skills assessed by a test. May require work experience or completion of a particular course of study or training program. Usually time-limited—must be renewed with continuing training or periodic exams.

Certification. Awarded by an independent third party—generally a company, a trade association or a professional association. Competency-based, with skills assessed by a test. Certifies the credential holder has demonstrated the knowledge, skills or competencies to perform a specific job. Indicates nothing about where the certified worker acquired skills or how. Often needs to be renewed with continuing training or periodic exams.

posits that 71 percent of this combined category is licensed, suggesting that as many as 7.2 percent of adults might hold industry certifications.[18] Other estimates concur that the percentage is in the single digits—perhaps as low as 3 percent, perhaps as high as 6 percent to 7 percent.[19]

Other emerging data add nuance to the profile of certified workers. A 2017 study by Burning Glass Technologies—one of the few to look at certifications divorced from licensure—finds industry credentialing significantly more prevalent in technical fields.[20] Few certifications measure soft skills, and those that do are in relatively low demand among employers. Similarly, according to the 2014 Census study, 70 percent of workers in technical occupations are licensed or certified, suggesting—if the researchers' 70-30 ratio of licenses to certifications applies—that up to 20 percent of technical workers might hold industry credentials.[21]

A recent analysis of new Census data by American Enterprise Institute (AEI) researcher Rooney Columbus helps further to disentangle certifications and licenses. Among its findings: licensure is far more prevalent among workers with bachelor's degrees or more—43 percent of those with graduate or professional degrees hold licenses—while those without four-year degrees are slightly more likely to be certified.[22]

Bottom line: the number of certified workers is relatively small, but certification appears to be gaining on other subbaccalaureate credentials. For most of the last four decades, academic certificates have been the fastest growing postsecondary award: between 1984 and 2009, the number of students earning certificates grew by 800 percent, and nearly as many learners now earn certificates as associate degrees.[23] But the 2017 Burning Glass study found employers 10 times more likely to ask for certifications than certificates, with some 9 percent of 2015 job postings in unlicensed fields specifying a preference for certified workers.[24]

Potential. The potential of certification starts with signaling—better, more transparent information about labor market supply and demand. Educators and employers report that the new awards make it easier to communicate, providing a vocabulary to talk about in-demand skills and hard-to-fill jobs.[25] Educators say they welcome the new target—a way to focus teaching and learning and connect it to the job market.[26] Students preparing for certifications are more likely to be learning skills in demand in the labor market.

But the perceived benefits of certification do not end there. Earning an industry credential is generally faster and cheaper than earning a degree. It can be particularly appealing for midcareer adults in a hurry to get back to the workplace, who often have little time for the general education courses—English, math, social science—required for associate degrees.[27]

Research suggests that up to 20 percent of technical workers may hold industry credentials.

Industry credentials are also portable. Many if not most are recognized nationally, as meaningful to employers in Alaska as in Florida. And the best certifications are stackable. A novice can use a first credential to get an entry-level job, then continue training—on the job or in a formal program—to attain a more advanced certification that allows him or her to move up on the job.[28]

By and large, this promise is still conjectural—based on anecdotes and perceived potential—and very little is known about the labor market return to certifications. But researchers are beginning to offer preliminary estimates.

The 2014 Census analysis combines licensure and certification in a single category and finds the most significant returns accruing to workers with graduate and professional degrees, who are more likely to hold licenses. But workers with associate degrees or less, who may be more likely to have certifications than licenses, also earn a premium for their credential—roughly $500 a month, or $6,000 a year.[29]

More recently, the 2017 Burning Glass study found that employers who seek certifications offer a significantly higher starting salary to certified job applicants—as much as 18 to 20 percent higher in some fields.[30] The 2019 AEI analysis did not attempt to estimate earnings gains but found indirect evidence that some certifications may be more valuable than others: blue-collar workers certified in STEM fields and the skilled trades appeared more likely to see gains than those in allied health and personal care.[31]

Challenges. Whatever the potential of industry credentialing, perceived or real, there are also significant challenges standing in the way of broader adoption.

The problem starts with public awareness. Employers in many fields are unaware of the certifications on offer in their industries.[32] Others are confused about which credentials could help them identify workers with in-demand skills. Students and parents often know even less or can't imagine that a certification could be more valuable than a traditional academic degree.

A second major concern: uneven quality. Certification is a burgeoning, tumultuous field, difficult to navigate for employers and learners. There is no reliable count of the number of bodies issuing certifications. Only a small percentage of them—most estimates suggest no more than 10 percent—are assessed or accredited by third parties.[33]

According to Burning Glass, in 2015 employers seeking workers for unlicensed positions mentioned 2,500 certifications in online job postings, but two-thirds of these requests named the same top 50 credentials.[34] And most certifying bodies make little effort to collect data on who holds credentials or their labor market outcomes.

Advocates and skeptics alike are uncertain who should oversee the quality of industry credentialing. They are also divided about what would constitute effective quality control.

A number of industry groups offer guidelines about inputs—what should go into developing a quality credential.[35] Researchers and policymakers tend to be more concerned about outcomes—labor market gains to certified workers. But business representatives have resisted suggestions that the federal government monitor quality or outcomes, in effect picking winners and losers among credentials.

In the absence of federal oversight, many states are stepping in, developing lists of approved credentials to guide state funding for high schools, colleges and other training providers. Several nonprofit groups are developing capacity to track and sort industry credentialing. Three of the most promising: a Business Roundtable spinoff now operating independently, Credential Engine; a dedicated affiliate of the authoritative American National Standards Institute, Workcred; and a US Chamber of Commerce Foundation initiative designed to link employers and job seekers with certifications.

In the private sector, both Burning Glass and LinkedIn have shown increasing interest in industry credentialing and are likely to play a growing role if and when certification is adopted on a larger scale.

Still, for now, the field remains highly fragmented and often confusing to consumers—employers, educators, students and workers—undermining the promise of better signaling and slowing uptake of industry credentialing.

A role for policy?

Policymakers are often uncertain what to make of certifications. Some are drawn to the promise of the new awards—their potential to link students to the labor market. Others are cautious, concerned about the challenges of a new, unproven approach. But even with these doubts, the federal government and many states are pressing ahead, moving to incentivize uptake and develop mechanisms for determining the quality of certifications.

Federal lawmakers have focused on incentives. The $1.9-billion Obama-era Trade Adjustment Assistance Community College and Career Training grant program rewarded colleges that offered programs preparing students for certifications.[36] WIOA funding for government-run job training and career services encourages providers to gear learning to certification assessments and requires programs to report the percentage of trainees who earn postsecondary credentials, including certifications.[37] So too Perkins V, which funds career and technical education (CTE) at high schools and community colleges: attainment of postsecondary credentials, including certifications, is viewed as a sign of quality at both secondary and postsecondary CTE programs.[38]

State and federal policymakers are encouraging uptake of industry certifications.

Many states are moving even more assertively.[39] State agencies struggle to collect data on certifications; neither certifying bodies nor students are required to report credentials earned. But many states attempt to track and include this information in state longitudinal student data systems. Other states have set percentage-based goals for postsecondary educational attainment, and some include certifications along with academic certificates and degrees. Florida rewards schools and teachers—with institutional funding and bonus pay—for every student who earns a nationally recognized industry certification.[40]

The core conundrum for lawmakers, state and federal, is quality assurance. Used properly, certification can function as a means of quality control—a tool to distinguish which education or training pays off in the labor market. But certifications themselves are highly uneven in quality, making it potentially treacherous to rely on them as indicators of quality.

In the absence of better data, many states rely on local employers to identify high-quality credentials. Input from employers spurred an early Kansas experiment rewarding high schools for every student who

earned a certification.[41] Thirty states have or are creating lists, usually developed in consultation with employers, that identify industry credentials believed to have value in the labor market.[42] Virginia and Iowa offer financial aid to college students working to earn certifications, and both states look to employers for input about which certifications they value.[43]

The implicit rationale: in the absence of data about certified job applicants' employment outcomes, uptake by employers can serve as a way to assess the quality of industry credentialing. Employer approval is less rigorous than accreditation; there's no systematic inquiry into the attributes of the credentialing body or how it develops and maintains certifications. And as a means of quality assurance, ultimately uptake is no substitute for outcomes data. Still, many states are betting it can be a telling indicator. What uptake suggests: that a credential is valued in the labor market and working to some extent to connect learners to open jobs.

THREE CREDENTIALING BODIES

The industry-driven credentialing bodies that develop and maintain certifications are a hidden world, largely unknown to the public and, often, to many employers in their sectors.[44]

Roots

Among the earliest to emerge—in many ways the model for those that came after—was the National Institute for Automotive Service Excellence (ASE), launched in the early 1970s in response to a wave of public anxiety. Ralph Nader's 1965 bestseller, *Unsafe at Any Speed*, had fanned Americans' fears about auto safety, fueling concern about poor engineering and shoddy repair work. Congress held hearings—angry, high-profile hearings that continued over several years.[45] What finally goaded the industry to act: talk of requiring that auto mechanics be licensed by state authorities. The industry could imagine nothing worse, and it decided to preempt the threat by regulating itself.

The National Center for Construction Education and Research (NCCER) was also launched in part to preempt regulation by the government. On October 23, 1989, a giant explosion rocked a Phillips 66 petrochemical facility in Houston, killing 23 workers and injuring 130 others.[46] Alarm spread through the energy sector and the industrial construction contractors that serve it, maintaining and repairing the sophisticated equipment in petrochemical facilities. Then the US Department of Labor Occupational Safety and Health Administration (OSHA) signaled it was considering regulatory action, commissioning a study of worker safety in the energy industry.

What goaded the industry to act: talk of requiring that auto mechanics be licensed by state authorities.

At around the same time, a group of leading contractors came together to form an organization—NCCER—devoted to improving training in the construction sector. And when OSHA issued a rule requiring petrochemical companies to test the competencies of contract workers, the new nonprofit took on the job of developing standardized tests.

The primary goal in those early years for both ASE and NCCER was to upgrade the quality of workers in their industries. The challenge started with public relations: improving the image of the industry. But it also meant enhancing skills, particularly for frontline, blue-collar workers. Equally important, particularly in industrial construction, was documenting the skills and experience already prevalent in the industry. Skills shortages and labor mismatches were not yet the issue they are today, and by all accounts, the crews performing maintenance in oil refineries in the 1980s were a seasoned workforce: qualified, proficient, with extensive experience, but without the credentials to prove it—most had acquired their skills on the job.

Both ASE and NCCER were determined to spur more extensive training—safety training and skills training. Both were intent on incentivizing employers

'We're OCD about accuracy,' one executive explained.

to engage more actively in workforce development, providing training themselves or partnering with educational institutions that provide it. The guiding principles at both organizations were rigor and professionalism; their overarching aim was to standardize skills across their industries. Neither body was particularly focused on labor market signaling—that would come later. "We're here to serve the public good," one ASE executive explained recently, echoing his organization's founding rationale, "by improving the quality and professionalism of automotive repair."[47]

It was an ambitious goal, and both industries rallied around it—high-level buy-in for the mission and the organizations gearing up to carry it out. In the early 1970s, the Big Three carmakers—Ford, Chrysler and General Motors—joined forces with the National Automobile Dealers Association, the Automobile Manufacturers Association and a handful of foreign manufacturers. Together this group recruited representatives from every corner of the automotive market—manufacturers, dealers, the aftermarket sector, service franchises and mom-and-pop repair shops. The big firms provided financial backing. Others were drawn into the process of developing the first credentials.

So too in the 1990s at NCCER. There were 11 leading contractors present at the creation, including Bechtel, Brown and Root, Fluor and Zachry, along with one of the industry's largest trade associations, the Associated Builders and Contractors.[48] And in this case too, industry leaders stepped up to provide start-up funding—between $170,000 and $2 million apiece from several major industrial contractors.[49]

Both consortia—first the automotive industry, then industrial construction—partnered with respected educational consultants: the Educational Testing Service and Experior Assessments. And both launched independent nonprofits charged with setting professional standards for their industries.

NIMS was formed a few years later, followed in short order by scores and then hundreds of other industry credentialing bodies. There can be no way of assessing how many of these newer groups rise to the standards of ASE and NCCER. But the culture of rigor and excellence ingrained in the early years persists today at both organizations. Both follow an exacting consensual procedure to develop skills standards and assessments. Both collaborate closely with professional educators and quantitative psychometricians. Both are highly data-driven—they see what they do as a science and look to statistical analysis to ensure that tests are reliable and consistent.

"We're OCD about accuracy," one executive explained.[50] And both bodies continue to rely heavily on support from the leading firms in their industries: sometimes financial support but also, perhaps more importantly, support for the mission—training and professionalism.

Culture and functions

The overarching goals and methods are the same at all three credentialing bodies—ASE, NIMS and NCCER. But their industries are different, and each has chosen to execute the mission in a somewhat different way.

All three develop skills standards and produce tests. All three issue credentials to successful test takers. In addition to these core responsibilities, all three accredit training providers, setting standards, evaluating programs, visiting campuses and validating quality much like traditional academic accreditors. NCCER also accredits assessment centers.

The differences among the three bodies are sometimes small—a matter of degree—and sometimes more significant. NCCER assessments are offered on-site at a company or other NCCER-accredited test provider.[51] ASE partners with one of the leading global test-delivery firms, Prometric, to offer exams at a national network of secure, computerized test centers.[52] ASE has chosen not to develop curriculum; NCCER has made that a core function and reaps much of its revenue from curriculum sales. NIMS also earns royalties on curriculum aligned with its skills standards.

Only NCCER makes a concerted effort to track credential holders and maintain trainee records. The organization keeps a national registry of workers who have taken NCCER assessments—an electronic database accessible to trainees and, with their permission, the employers who hire them. Neither NIMS nor ASE follow credential holders or keep any kind of record of their careers. None of the three organizations tracks certified workers' employment outcomes—job placements or wages.

All three organizations are interested in on-the-job training, but each approaches it somewhat differently. ASE runs a national internship program for high school students. NIMS has developed US Department of Labor–approved standards for registered apprenticeship programs. NCCER was an early leader in helping firms structure industry-driven apprenticeship. None of the three bodies train workers directly, but all provide some instruction and support—varying in intensity—for training professionals. All three also see it as their role to recruit workers to their industries, at ASE and NCCER programmatically, at NIMS more indirectly, by raising the level of professionalism in the industry.

(See the box on pages 16 to 17 for a closer look at the three credentialing systems.)

Each of the three credentialing bodies tracks its reach in a different way, making it all but impossible to compare the three systems. NIMS is the newest and growing fast, but it is still confined to a relatively small share of the metalworking industry, with perhaps 20,000 trainees passing NIMS assessments every year.[53] NCCER counts the number of students enrolled in programs that use its curriculum and the number of training modules they complete—a smaller unit than the generally semester-long curricular levels marked by NIMS assessments. But NCCER's reach is significantly wider: some 397,000 learners studied NCCER curriculum in 2016, and more than 2 million modules are completed every year.[54] ASE uses cumulative rather than annual numbers to measure its industry penetration, counting some 224,000 credentialed professionals working in the US today—roughly one-third of the technicians employed in the automotive industry.[55]

Burning Glass assesses reach by analyzing job posts (table 1). Credentialing bodies say some employers hesitate to mention certifications in want ads even when they prefer that new hires have credentials. But absent other data, Burning Glass offers one of the few metrics available to assess industry credentialing.

WHAT THE WANT ADS SAY

Table 1. Employer requests and salary

METRIC	ASE	NCCER	NIMS
Job posts requesting credential	79,303	4,573	428
Share of posts requesting credential that are open to entry-level workers	52.3%	16.6%	41.6%
Credential holders' median salary	$44,937	$44,323	$39,954
Median salary premium	12.2%	no premium	22.7%

Source: Burning Glass Technologies, 2019, www.burning-glass.com.
Note: Burning Glass' artificial intelligence technology analyzes large numbers of online job postings—tens of millions in a single year—to provide insight into labor market patterns. Employer requests and salary premiums not listed in online job posts are not included in the data. The information here reflects the period August 2018 through July 2019.

THREE CAREER LADDERS

Credentialing bodies NIMS, ASE and NCCER share a common mission and a common approach to core functions like test development. But the three organizations differ somewhat in the career paths they offer trainees—a function in large part of the differences in the skills required in each industry.

NIMS. Machining is a hands-on skill, visual and tactile—even today, as digital equipment replaces manual tools, as much a matter of dexterity and muscle memory as technical training. Precision is essential: parts are often milled to within .0005 or .0001 of an inch. But many hiring managers say they know talent when they see it even in a relatively untrained worker, and master craftsmen often report that they honed their skills on the job.

NIMS issues credentials in a wide range of manufacturing occupations—53 different awards in machining, stamping, metal forming, die making and industrial technology maintenance, among other trades.[56] But machining is the most popular—what one executive calls the "gateway" to the industry and the core of NIMS business.[57] Four or five basic machining-related certifications account for more than 80 percent of those issued by the organization every year, and all are what NIMS calls Level I—essentially entry-level credentials.

Learners often prepare for NIMS tests in school settings—high school or colleges. Assessments are generally administered at the school. Many NIMS credentials require an on-paper knowledge test and a hands-on project. In theory, trainees can advance through a NIMS-structured skills progression, taking Level II assessments and adding breadth by training for related occupations. But according to NIMS executives, relatively few trainees progress in this way. Most earn one or two credentials and enter the workforce in an entry-level position, with any additional training taking place informally on the job.

NIMS does not require trainees to have experience in order to qualify for a credential. Unlike with many certifications, workers do not need to keep credentials current by retesting over the course of their career. There is no journey-level NIMS certification—no distinction for a fully trained professional qualified to work without supervision. And few employers look to NIMS credentials to signal experience or advanced machining skills.

ASE. Automotive maintenance and repair has changed dramatically in recent decades. Cars are constantly evolving. A typical new luxury car has some 150 electronic control units, and digital diagnostic software has replaced many manual tools.[58]

Automotive technicians still get dirty, but they need more theoretical knowledge than in the past. Workers must keep up with changing technology and equipment. According to experienced technicians, one of the most important skills is knowing where to find information—often proprietary or brand-specific online information needed to interpret digital diagnostic tests. And the industry devotes significant resources to training and retraining.

ASE issues two kinds of credentials: one set designed for students, primarily a tool to draw young people into the industry, and the other for working professionals. There are 50 different professional tests, grouped in what the organization calls "series," generally by vehicle type. Among the most popular series: automobile, medium and heavy truck, transit bus, hybrid and collision repair.[59]

All ASE assessments are theoretical and knowledge-based, administered at computer terminals in a secure testing center—there is no hands-on performance appraisal. But

professional trainees cannot be certified until they have spent two years on the job working in the specialty for which they seek to be certified. Technicians must renew their credentials throughout their careers, in most cases every five years—retesting designed to help sharpen skills and keep up with changing technology.

Many if not most ASE certified workers progress in skill over the course of their careers, adding breadth by taking new tests in new areas. Others supplement their ASE credentials with proprietary certifications from automotive manufacturers—most of the big manufacturers, US and foreign, have their own credential ladders. And many automotive employers align internal promotions with ASE assessments.[60]

NCCER. The construction labor market is also constantly changing—change driven in part by new technology and in part by the business cycle, which fluctuates dramatically, sometimes sharply reducing demand, sometimes rapidly inflating it. Hiring is often project-based; workers move frequently from job to job. And in recent decades the industry has devoted increasing resources to training—particularly safety training.

NCCER serves the entire industry—residential, commercial and industrial construction. But its core business is industrial: exacting, often dangerous jobs, building or maintaining manufacturing facilities, power plants, oil refineries, bridges and electrical grids, among other highly sophisticated technical projects.

Many industrial contractors turned to training in earnest a generation ago to keep up with safety standards. In those days, many if not most trainees were experienced workers in need less of new skills than of verification of existing mastery. NCCER tests were used primarily to assess the skills of incumbent workers, who were sometimes found to need additional training, but often simply certified as journeymen. As that generation has given way to a younger one and many veteran craftsmen have left the industry, training has focused increasingly on teaching new skills to entry-level workers, and NCCER has evolved accordingly.

Today's test takers are often recent trainees. Roughly one-third prepare in high school, another third at community colleges, and the remainder at construction companies or trade association training centers. Learners progress through NCCER curriculum packaged in short, easily digested units—training modules that can often be mastered in a few weeks. Each module leads to a knowledge test and a performance assessment. Test results are recorded in the NCCER online registry. Trainees accumulate modules to complete levels—often a semester's worth of training. It generally takes three to four levels to become a journeyman.

What this means for workers: unlike NIMS certifications, which are often earned before you enter the industry, NCCER training may start before you are hired—with Level 1 or even a few modules sometimes enough to land an entry-level job. But many craftsmen continue to train on the job, often moving up the NCCER ladder of credentials over several years.

Journeyman is a major watershed. After completing the required levels of training, learners sit for a theoretical knowledge test, delivered online. Then, after a minimum four years of on-the-job experience, they undergo a "performance verification," and those who pass earn a "Certified Plus" credential, indicating they have reached journey level.

Unlike in the ASE system, there is no retesting—craftsmen do not need to repeat assessments every few years. But many employers expect workers to continue training, adding modules or levels or broadening their skills with knowledge of related trades.

Many craftsmen continue to train on the job.

Costs and revenue streams also vary across the three systems.

- **NIMS.** Some 70 percent of NIMS revenue comes from selling exams, in some cases to students but often to training providers who purchase tests in bulk. An individual student generally pays between $80 and $125 per assessment.[61] NIMS supplements this income with accreditation fees and train-the-trainer programs, and most years, the organization brings in as much grant funding from foundations and the federal government as it earns in revenue.

- **ASE.** ASE also relies on test fees and what it earns for accreditation of training programs. Test takers pay $36 to register with ASE, then add a fee for each test—$43 for all but the most advanced assessments.[62] A sister organization, the ASE Education Foundation, receives substantial grant funding. And, unique among the three credentialing bodies, industry partners—mostly manufacturers and other employers—cover the cost of developing each new test. The estimated price of a new assessment: in the low six figures.

- **NCCER.** Roughly 60 percent of NCCER's revenue comes from royalties on curriculum. Learners pay $20 per module, or between $65 and $125 per level.[63] Training providers and accredited test centers often buy tests in bulk. The organization also makes money accrediting training programs and assessment centers.

Keeping current

The primary challenge facing all industry credentialing bodies is keeping up with changes in the sectors they serve—new technology, new regulations, new training methods and hiring habits. Certifications are useful only if they signal skills in demand among employers—competencies needed today to succeed on the job, not last year's computer coding or a previous decade's welding technique.

A certification system is only as good as its ability to keep current.

Bottom line: a certification system is only as good as its ability to keep current, and all credentialing bodies struggle to stay ahead of their industries' shifting demand. "Developing and updating the tests is a never-ending hamster wheel," explained one veteran ASE executive. "Create, update, rinse and repeat."[64]

The first step in the process: determining when something new is needed, whether a brand-new test or an updated version of an existing assessment. ASE, NIMS and NCCER rely on input from employers in their industries. All three maintain extensive networks of companies that rely on their credentials, and all devote considerable effort to keeping up with these firms, convening boards and advisory councils, attending trade shows and conferences, monitoring want ads and asking companies for online feedback. The input credentialers are listening for: Is a new technology taking hold or an old one phasing out? Should a particular test be updated or perhaps retired from the roster?

All three credentialing bodies collect extensive data on how test takers perform on assessments, and this too helps the organizations determine if a test needs to be revised. Financial considerations play a role. ASE cannot develop a new test until its industry partners see enough demand to justify paying for a new assessment. And there's little point for any of the three credentialers to continue offering a test if so few trainees take it that it no longer generates revenue.

However demand for tests is determined, all three credentialing bodies report that it's unrelenting. ASE hasn't created a new credential in several years, but every year it holds 10 or more three-day workshops to update existing credentials. NIMS is currently working on three assessments: a brand-new test, a major revamping of an old one and the routine updating of a third exam. NCCER has developed three completely new certifications in the last few years. And all three organizations aim to refresh their credentials on

a three- to five-year cycle—every test they offer is regularly reviewed and revised.

Whether creating a new test or updating an old one, the process is much the same. It starts with recruiting a small group of industry insiders, often called "subject matter experts" (SMEs) who may spend as long as a year together developing an assessment. All three credentialing bodies recruit from across their industries, aiming for maximum diversity: different types of employees from different kinds of companies, large and small, located in different regions of the country. ASE, for example, seeks a mix of automotive manufacturers, aftermarket service franchises and mom-and-pop repair shops, plus a blend of frontline technicians and supervisors.

The three credentialing bodies manage these experts somewhat differently, but a typical working group is made up of six to 12 technicians who travel to the organization's headquarters for four or five days at a time, several times over the course of a year, and work intensively through the week on developing or revising a single credential.

The core principle—an article of faith among credentialers—is the power of consensus. "The consensus process is remarkably reliable," an ASE executive explained.[65] "If you have the right people in the room and the right facilitator, you really can't go wrong," echoed an officer at NCCER. "The SMEs occasionally go off on a tangent, but it's rare, and together they are each other's quality control."[66]

NCCER calls the first step in the consensual process a DACUM, an acronym for "developing a curriculum," and traces it back some 50 years to researchers at the Ohio State University. Other credentialing bodies use the terms "workshops" or "committees." Whatever the label, it's a three-part process: developing skills standards, developing tests and reviewing and adjusting the assessments.

The most important step is the first: identifying the skills needed to perform successfully on the job. Each SME committee targets a single occupation, which it breaks down into "duties" or "tasks." Then the group zeros in on the steps required to perform each task and the competencies workers need for these essential activities. It's a detailed, painstaking exercise. Duties are often scenario-based, sometimes geared to a particular product or diagnostic process. It can take several weeklong meetings to develop a skills standard.

The next step: writing a test. Questions should align closely with the skills standard. They must be concrete and specific. They too are often scenario-based and are generally posed in a multiple-choice format. In a typical DACUM process, it might take yet another weeklong meeting to convert a skills standard to an assessment.

The third step looks beyond the SME committee for input and quality control. NIMS surveys several hundred employers, seeking their opinions about each assessment. All three organizations hire psychometricians to vet the reliability and fairness of test questions. All three also beta test questions and collect extensive data on how they perform: do they distinguish successfully between more and less able test takers?

It's a three-step process: developing skills standards, developing tests and reviewing and adjusting the assessments.

Once the questions have been packaged as an assessment, the SMEs and psychometricians determine a cut score—the line between passing and failing. And all three organizations maintain ample question banks. If a typical test consists of 50 to 60 multiple-choice questions, the credentialing body might keep 1,000 questions in reserve—enough to swap out questions on successive days or when an individual test taker repeats an exam.

How many of the estimated 5,000 credentialing bodies operating in the US today are as exacting as ASE, NIMS and NCCER? No one knows—most are not assessed or accredited by third parties.

The credentialing marketplace asserts a kind of discipline. Tests that don't measure in-demand skills or keep up with changing technology are unlikely to be popular with employers. It's an imperfect standard. Just because a certification is popular does not ensure it's rigorous or reliable. But in the absence of accreditation or data on employment outcomes, employer uptake is among the only available indicators of labor market value—a measure of quality and a means of quality control. Do employers across the industry look to these credentials when hiring or promoting workers?

THE EMPLOYER PERSPECTIVE

NIMS, ASE and NCCER enjoy robust support from leading employers in their industries. All three maintain impressive lists of employer partners. All count on close relationships and backing from major trade associations in their sectors. Brand-name global companies and smaller firms that put a premium on training sit on advisory boards, help market certifications, pay to send employees to SME workshops and, in many cases, provide direct financial support.

But industry buy-in is not the same as employer uptake—company-by-company uptake at the ground level. Are employers across the sector aware of ASE, NIMS or NCCER certifications? Do they believe these credentials signal skills in demand at their companies? Do firms use the awards to make decisions about hiring and promotion?

This study explores these questions among a small sample of employers. Our method: semi-structured, in-depth interviews at 18 companies—six per industry, three that consider certifications when hiring and promoting workers and three that do not.[67]

In each industry, we chose a geographic area likely to have a heavy concentration of employers in that sector. Our three targeted locations: construction contractors in the Gulf Coast, home to a large number of industrial construction firms, among others; manufacturing firms in the corridor between Pittsburgh, Pennsylvania, and Akron, Ohio, known locally as Carbide Valley; and automotive maintenance and repair shops in the Dallas–Fort Worth area. Among other reasons, we hoped this clustering would reduce geographic differences in labor market supply and demand that could influence employers' need for better signals about workers' skills.

In each industry, we made an effort to include a range of firms: small, medium and large, corporate and independent.

In other sectors—commercial construction and independent automotive repair shops—the default choice was still nonuse.

In addition to these 18 interviews, we also spoke with a half-dozen other major industrial construction contractors who sit on an NCCER advisory committee—a series of less structured conversations that nevertheless provided essential insights into the industry and its use of NCCER certifications.[68]

The box on pages 22 to 24 contains brief descriptions of the 18 companies we visited.

Users and nonusers

Somewhat of a surprise to us and perhaps unusually, all the employers in our sample were aware of the certifications on offer in their industry. No one we approached for an interview was confused by our questions or unfamiliar with their sector's leading credentialing body.

Yet companies in some fields—generally, specialty subsectors such as industrial construction or automotive dealerships—were more likely than others to be knowledgeable and more likely to use credentials when hiring and promoting workers. In other sectors—commercial construction and independent automotive repair shops—the default choice was still nonuse.

EIGHTEEN COMPANIES

AUTOMOTIVE

Bridgestone. Now a global company, the largest tire manufacturer in the world, Bridgestone operates 2,200 company-owned automotive tire and service centers across the US. Together, these stores employ some 22,000 workers, three-quarters of them technicians, and all—including the 60 Bridgestone outlets in the Dallas–Fort Worth area—follow corporate policy on personnel matters, relying on ASE certifications to hire and train workers, structure promotions and determine compensation levels.

Firm Automotive. An independent repair shop in Fort Worth, Texas, Firm Automotive specializes in servicing diesel engines, primarily for companies that maintain vehicle fleets. The small shop has seven employees, five of them skilled technicians, and little turnover—no technicians have been hired in the last two years. Owner John Firm is active in a local trade association and supportive of employee training, but he does not rely on ASE certifications when hiring or promoting workers.

Fort Worth Tire & Service. Despite its name, Fort Worth Tire & Service is a small all-purpose automotive repair shop in a rundown industrial neighborhood of the Dallas–Fort Worth metroplex. The business currently employs 14 people and struggles to find skilled technicians. Employees are encouraged to attend occasional training offered by parts suppliers—proprietary instruction that helps technicians keep up with changing automotive technology. But the firm does not look to ASE certifications when hiring or promoting workers.

Louden Motorcar Services Inc. Louden Motorcar Services Inc. is a small, high-end independent repair shop specializing in foreign cars—Mercedes Benz, Porsche and BMW. All four technicians are ASE-certified, three of them with master certifications. President Steve Louden attributes his success—the 40-year old shop is consistently ranked among the best in Dallas—to his emphasis on skills and skills training. He pays for employees to attend training, looks to ASE certifications when hiring and gears promotions to completion of ASE credentials.

Tommy's Shop. A tiny independent repair shop on the outskirts of Fort Worth, Tommy's Shop serves a small, loyal clientele. With just four employees, including the owner, the firm rarely hires or promotes technicians. Employees are encouraged to keep current by attending classes offered by parts suppliers, but the shop sees no need to look to ASE certifications when hiring or promoting workers.

Toyota. The global automotive manufacturer maintains some 1,400 dealerships in the US, and together these outlets employ more than 12,000 technicians. The company maintains its own certification system, several regional US training centers and relationships with some three dozen community colleges that offer Toyota-specific technical instruction. The firm's proprietary certifications are designed to build on and complement ASE credentialing. Dealerships are encouraged to look for ASE certifications when hiring technicians, and promotions are based on completion of additional ASE and Toyota credentials.

CONSTRUCTION

Chamberlin Roofing and Waterproofing. A medium-sized commercial roofing contractor, Chamberlin operates out of six locations in Texas and Oklahoma and employs between 600 and 900 workers, all but about 100 of them in the field. The firm values training and recently launched a small apprenticeship program. It does not look to NCCER credentials—there is no NCCER roofing certification—but relies on curriculum developed by the National Roofing Contractors Association.

ISC Constructors. With some 3,500 employees across the Gulf Coast, Louisiana-based ISC Constructors is a medium-sized engineering and industrial construction firm specializing in instrumentation and electrical work for large energy companies and industrial manufacturers. The contractor maintains a robust internal training operation. Upskilling is mandatory for all employees. ISC is an accredited NCCER assessment center, and journeymen employed by the firm must hold NCCER certifications.

Jacobs Engineering. Jacobs is a large engineering and industrial construction firm with some 70,000 employees worldwide. The US construction division employs more than 10,000 workers, including more than 3,000 journeymen performing upgrades and maintenance at petrochemical facilities.[69] Executives estimate that the division spends $1.5 million a year on internal training, most of it based on NCCER curriculum. New hires are not required to have NCCER credentials but are given NCCER assessments to determine if further training is appropriate. Journeymen are expected to have or be working toward NCCER Certification Plus.

Karsten Interior Services. A medium-sized commercial construction firm with roughly 500 employees, Karsten installs drywall, acoustical ceilings and other interior finishes in office buildings, hospitals and sports facilities. The firm prides itself on its safety training and on-the-job mentoring and has considered using NCCER, but managers do not currently look to certifications when hiring or promoting workers.

Marek. A large commercial construction contractor with operations across the Southeast, Marek employs some 2,300 craftsmen and other workers to design and build interior finishes for office towers, shopping malls, airports and sports stadiums. A strong proponent of training and promoting from within, the firm spearheads a collaborative of Houston, Texas, construction contractors committed to workforce development. Marek's in-house training uses NCCER curriculum along with the company's own materials and encourages but does not require journeymen to be NCCER certified.

Oxford Builders. Oxford is a small carpentry contractor with 50 employees that builds frames and installs doors, often for public-sector projects—schools, colleges and hospitals. When hiring, the firm looks more to work ethic and dependability than technical skills, and it does not use certifications to guide hiring or promotions.

MACHINING

Accurate Marking and Manufacturing. A small machine shop—just 15 employees—in an industrial park a short drive from Pittsburgh, Pennsylvania, Accurate Marking and Manufacturing produces tools, dies and molds for manufacturing companies. The owner is committed to training his employees and recently launched a small apprenticeship program, offered in partnership with a local training center, designed around NIMS coursework and hands-on projects.

Elizabeth Companies. A medium-sized precision manufacturer in western Pennsylvania, Elizabeth Companies makes precision tools and machinery for several sectors, including pharmaceutical companies. Many of the firm's 250 employees are aging toward retirement, and managers struggle to fill technical positions. The company does not ask job seekers for NIMS credentials—very few applicants in the region have them—and relies on informal job shadowing to onboard and upskill employees.

NN Inc. NN Inc. is a large precision manufacturer headquartered in Charlotte, North Carolina, that provides components to automotive, industrial and medical companies around the world. More than 400 of the firm's 5,000 employees, many of them women, work in a machine shop in rural northeast Ohio. The facility partners with both a vocational school and a community college to recruit and train workers, but it does not use NIMS curriculum or expect new hires to have NIMS credentials—managers say few applicants in the area are NIMS certified.

Oberg Industries. A medium-sized precision manufacturing firm with 900 employees, 700 of them in western Pennsylvania, Oberg Industries produces parts for Fortune 500 automotive, aerospace, energy and medical companies. Oberg is an active supporter of NIMS. An Oberg executive currently chairs the NIMS board of directors, and the company invests heavily in workforce development—all new machinists undergo apprenticeship training designed around NIMS curriculum and hands-on projects. Yet the firm does not require that entry-level machinists be NIMS certified.

Penn United Technologies. A close competitor of Oberg's, about the same size and located just 10 miles away in western Pennsylvania's Carbide Valley, Penn United also produces precision parts for automotive, aerospace, energy and medical manufacturers. The firm prefers to hire NIMS certified technicians but struggles to find them, and it maintains several registered apprenticeship programs that use NIMS materials to assess and train entry-level employees.

Wagner Machine Inc. Wagner Machine Inc. is a small custom machining and fabrication shop—just 28 machinists—in a semi-rural area west of Akron, Ohio. The firm does not look to NIMS credentialing when hiring or training workers but screens job applicants with a similar test developed by the National Tooling and Machining Association (NTMA), one of the five trade groups that came together in the 1990s to found NIMS. Wagner also relies on NTMA for training materials—a series of online modules, several of them based on NIMS skills standards.

Employers who do not rely on or reward certifications in any way experience many of the same pressures as companies that look to credentials. They too have difficulty recruiting workers, concerns about the training available in their area and complaints about the quality of job applicants. A commonly heard refrain from users and nonusers alike: "So many of the people we hire today just don't want to work."[70]

Employers who don't use ASE, NIMS or NCCER credentials respond to these pressures in other ways, but their choices are often more complicated than a simple rejection of the certification.

Rationales varied from firm to firm. Some smaller shops rarely hire or promote workers and see no need for a certification system. In other cases, the industry's dominant credentialing body does not offer curriculum or credentials for the jobs the firm needs to fill. There is, for example, no NCCER roofing certification.[71]

In some instances, there's an alternative to the dominant brand—another option for firms looking for curriculum and credentials. The roofing firm we visited uses curriculum developed by the National Roofing Contractors Association (NRCA) and will be a potential customer for NRCA's recently launched "ProCertification."

Other firms that could look to a widely known national certification would rather use a competing credential. One precision manufacturer we interviewed had a strong preference for curriculum provided by a trade group in her region, the National Tooling and Machining Association, and seemed unaware that its training materials lean heavily on NIMS skills standards.

Still other firms looked to a combination of the leading national credential and a parallel or alternative system. Toyota, like most automotive manufacturers, has its own proprietary credentialing system that builds on and complements ASE.

Another common explanation offered by employers who do not look to credentials as a hiring tool: they rarely encounter certified job applicants. This was particularly true among precision manufacturers. One employer we interviewed could not remember the last time she had seen a resume that mentioned NIMS certification.[72] But we heard the same reasoning from construction contractors, including in the industrial construction sector, where NCCER is most prevalent. "We just don't see them very often," a commercial construction contractor explained.[73]

Even firms strongly committed to the credentials in their industry—the nine companies we count as users—often hesitate to rely on them to hire workers. If they did, several said, they would have trouble staffing projects and fulfilling contracts. "Talent is hard to find," said the owner of a small repair shop. "You do what you have to do."[74] "If you walk in with ASEs," another automotive executive explained, "you're an almost certain hire. But with today's technician shortage, many dealerships will take anyone with a clean record and a good attitude."[75]

Bottom line: for many users and nonusers alike, demand for workers with certifications outstrips supply, and many firms that would like to incorporate credentialing into their hiring processes find themselves unable to do so.

Nonusers also offered a variety of other explanations. The credentialing in their industry measures knowledge, not the hands-on skill they need at the firm. Or they prefer to do their own training: one said she would rather start with a blank slate than someone "trained the wrong way."[76] Some worry about being handcuffed by a system. Several compared certification to unionization and feared it could dictate pay scales or promotions.

One manager, who said many of his workers are Latino, thought NCCER curriculum was not offered in Spanish. In fact, it often is.[77] Still others said they

A common explanation offered by employers who do not use credentials as a hiring tool: they rarely encounter certified job applicants.

'NCCER credentials put you at the front of the hiring line.'

prefer their own tried-and-true screening methods: their own informal prehire assessments, in-person interviews, a trial period on the job or what one small shop owner called "the smell test."

Less often mentioned but apparent across our sample: users were often larger companies or global corporations and firms more concerned about their reputations, frequently in sectors where external pressures played a bigger role in business decisions.

Many industrial construction contractors began certifying workers to satisfy what they call "owners"—clients, particularly the global energy companies that operate petrochemical facilities. Some automotive repair shops said credentialing is important to their customers. Still other employers talked about liability, particularly in industries where workplace safety is a significant issue. In other cases, the decision seemed driven by peer pressure or competition—two precision manufacturers, for example, vying for the same Fortune 500 customers.

Yet, even in these cases, it was sometimes hard to distinguish how much of the firm's motivation was extrinsic and how much was intrinsic—a commitment to superior skills and quality workmanship. For many of the nine users we interviewed, the two seemed to go hand in hand.

Steve Louden, president of Louden Motorcar Services Inc. and an early adopter of ASE, ticked off a list of hard-nosed reasons why he invests in a certified workforce, paying out of pocket for training, testing and bonuses for every employee who passes an assessment. "It's a business decision," he maintained. "It's about safety and liability. Customers look for the seal of approval."

But many of his pragmatic rationales seemed inextricable from his commitment to quality. Workers who recertify on the ASE timetable keep up with the industry, he reported. They perform better on the job. They behave more professionally. They're more productive and proud of their work.

ISC Constructors CEO Jerry Rispone made the same kind of case: "It's required by the owners," he said, "Exxon, Marathon and the rest. But that's not the only reason. It's also about the work. You can't perform quality work without trained, qualified people."

A hiring plus factor

All nine firms we classify as users take account of certifications as part of their hiring process. Many would like to require that job applicants be certified and would insist if that were practical—if there were a robust supply of certified workers looking for jobs in their area. Instead, they look to credentialing as a plus factor. "Our advertisements say NIMS preferred," one explained.[78] "We hire people off the street," another reported, "but NCCER credentials put you at the front of the hiring line."[79]

In the absence of certified workers, some firms give favorable consideration to job applicants who have started training toward a credential. "It might be as minimal as one NCCER module," said one hiring manager. "Even that's an advantage."[80] And the boost is often significant. "NIMS is more than a thumb on the scale," said another employer. "It's like two feet—it's huge."[81]

Certifications aren't probative or foolproof. Even the firms that find them most valuable have caveats. Much like a college degree, certification is a proxy. "It shows you've made some effort," said one employer, "and gone through a structured program." Certified job applicants come with what managers called a "base" or a "skeleton"—the "core competencies."[82] But it can be difficult for even the best assessments to capture experience or hands-on expertise.

ASE certification includes no performance test. Technicians must have on-the-job experience to earn ASE credentials, and test questions are scenario-based, but the multiple-choice assessments do not measure technicians' hands-on abilities. Most NIMS certifications require a hands-on performance test, but few trainees go beyond the entry-level rungs

of the NIMS credentialing ladder. NCCER requires craftsmen to put in time on the job before they are eligible to earn journey-level credentials. But several employers told us they think the requirement should be more stringent—they want some way to "verify" or "validate" applicants' on-the-job experience.

The bottom line for one hiring manager: "A NIMS credential is like a learners' permit. It tells me you can drive and not kill anyone. But it's not enough for me to put you in the Indianapolis 500."[83] "A certification is an essential benchmark," explained a construction executive. "But it's not the end of the story."[84] And many industrial construction contractors require even certified journeymen to take additional, proprietary performance tests before assigning them to critical jobs.[85] "They still have to show us what they can do," said one manager.[86]

Is the proxy better than nothing? All nine users in our sample think it is, as do the six other industrial construction contractors we interviewed. But it's one tool among many, and many employers can suggest improvements.

Training, promotion and pay

As important as hiring for many of the employers we interviewed, industry credentialing provides a framework to guide training and promotion of skilled employees. At many firms, this was the obvious next step—the next best solution in an environment where few job applicants have credentials and it's impractical to require that new hires be certified. Yet at many of the companies we visited, training and promotion structured around industry certifications has taken on a life of its own—arguably even more valuable to the firms than credential-driven hiring.

In this realm more than some others, we found that employer practices varied from industry to industry. All nine firms in our sample that endorse certifications use them in some way to structure training and promotions. But the process looks somewhat different in each of the three subsectors where it's most prevalent—precision machining, industrial construction and automotive dealerships.

Manufacturing. The biggest challenge facing the precision manufacturers we interviewed was recruiting entry-level workers. Once machinists have mastered basic techniques and equipment, most learn informally on the job, honing their expertise and gaining mastery over many years. But employers complain that entry-level workers lack basic skills to build on, and all three manufacturers we identified as users offer formal training for new hires, usually in the form of apprenticeship. All three structure their programs around NIMS curriculum.

In some cases, the apprenticeship program is built around a NIMS textbook or a skills standard developed by NIMS and endorsed by the US Department of Labor office of apprenticeship. Other firms are more selective: they've chosen a few of the hands-on projects required for NIMS certification performance tests and designed in-house training to incorporate them.

All three firms pay apprentices a baseline wage, and all provide training on the company dime, often at considerable expense. Trainees earn NIMS credentials, and those who complete programs graduate to a higher wage rate—between $3.50 and $5 more per hour. Yet at all three companies, even then, certified workers are considered entry-level, and from there on out, promotion and pay depend on demonstrated performance—productivity—rather than credentials.

Construction. Industrial construction contractors face a somewhat different challenge. Entry-level job applicants aren't exactly plentiful—all two dozen employers we interviewed, no matter what industry, struggle to hire workers in a tight labor market. But industrial construction firms pay enough to attract what many call "helpers." What they often can't

New hires are tested, then sent to training to remedy gaps in their knowledge and skills.

Technicians earn a bonus for every ASE assessment.

find are journey-level craftsmen—fully trained, proficient, able to perform on their own with little or no supervision.

NCCER credentialing was designed to meet precisely this need, and most of the industrial contractors we interviewed used the system in a similar way, starting with what one hiring manager called "gap analysis."[87] New hires are tested at an NCCER assessment center, often housed on-site at the company, then sent to training to remedy or fill in the gaps in their knowledge and skills. Sometimes, it's a small gap—a few NCCER modules are enough to reach journey level. But many trainees start at or close to the bottom and work their way up over several years.

Some firms structure this training as a registered apprenticeship program. In other instances, it's more informal. Some set up trailers at construction sites—classrooms with dedicated, NCCER-trained instructors. Others partner with community colleges or training centers operated by a national trade association. All have significant budgets for upskilling, and most hope the workers they train will stay with the firm through their careers—not a common pattern elsewhere in the construction industry, where the norm is intermittent, project-based employment.

One large contractor that helped found NCCER explained how it works.[88] The company recruits employees fresh out of high school and watches them carefully for six months. If their supervisor sees aptitude and a good work ethic, the next step is three weeks of intensive instruction at the company's state-of-the-art training center in Colorado. All learning is structured around NCCER curriculum and module tests, with what is sometimes a semester-length Level 1 course compressed into three weeks. Trainees who perform well in the field return to Colorado for three weeks the next year and again in their third and fourth years on the job. The last steps are NCCER knowledge verification and then, after some years of work, a performance assessment, culminating in a journeyman certification.

Pay and promotions follow accordingly. Few if any of the industrial contractors we interviewed promote workers to journey level without NCCER Certification Plus. And all compensate journeymen at a higher rate—usually between $2 and $4 per hour more than similarly skilled workers who have no credentials.

Automotive. The challenge for large automotive employers is different still: how to build training incentives into a corporate structure and ensure standardized skills—reliable, quality repair work—across a national brand. At both Bridgestone and Toyota, the answer starts with ASE credentialing.

Both brands hire extensively at entry level, and both have built internal career ladders that mirror ASE certifications, skill by skill and test by test from newbie to master technician.

How it works at Bridgestone: job applicants need not be ASE certified, and many come into the firm with little or no knowledge of the industry. The company has developed its own entry-level assessment and onboarding procedures, and new hires are put to work in basic jobs, perhaps moving cars around the lot or working as tire service techs. A next step might be the lube department, then rudimentary diagnostics, and on up the ladder to advanced technician. What triggers promotion at every level: an ASE certification test.

Bridgestone job grades A, B and C each correspond to specific ASE credentials. Technicians earn a bonus for every ASE assessment they pass. It's not a formal apprenticeship program, but workers combine classroom instruction with on-the-job experience. And it's a never-ending process: all ASE credentials must be renewed every five years—technicians who don't retest lose their certifications.

Workers earn more with every step up the ladder. The manufacturer's "flat rate" commission—pay geared to the time it takes a typical tech to complete a given task, like changing a tire—rises as you rise. Better-trained technicians are better equipped to beat the flat rate, changing, say, two tires in the

time it takes someone else to change one and earning twice the take-home pay. Combine a rising rate with increased proficiency, and the dollars can add up fast. At Toyota, according to one manager, a technician can add $100,000 to his pay over 20 years.[89]

What this means in practice for employees: a clear, well-charted path to promotion and increased pay—in effect, a career road map, all but guaranteed if you follow the path step by step.

The payoff for the corporation: what one Toyota manager called a "promotion culture"—an essential asset in attracting and retaining workers and ensuring quality across the brand.[90] It's not foolproof—both Toyota and Bridgestone employ thousands of workers. But in theory, every technician in every shop is trained to the same standard.

No one we interviewed at Bridgestone or Toyota used the term, but both are pursuing what labor economists call a "high-road" employment strategy.[91] The firm's training regime does more than upgrade workers; it also upgrades the jobs available at the company.

A firm with a skilled workforce can structure its workplace differently, reconfiguring jobs and reassigning responsibilities to make the best use of better-trained employees. There's an upfront cost for the company—a larger training budget and higher wage rates. But if the strategy works, it's a classic win-win for employer and employees. Skilled technicians work smarter and faster. They're more productive. They deliver better-quality products and services. The reward for workers: better jobs, better pay and the pride that comes with professionalism—all made possible in this case by ASE certifications.

Perceived value

None of the three credentialing bodies we examine keep data on test takers' employment outcomes. None track credential holders by Social Security number, so they are unable to match trainees with state or federal data on job placements and earnings—an increasingly common practice among many job training providers. And virtually none of the 15 users we interviewed—the nine in our sample or the six additional industrial construction contractors we spoke with for the study—could point to a concrete measure of return on investment (ROI).

The payoff for the corporation: what one manager called a 'promotion culture.'

Yet few of these 15 firms appeared to question the utility of industry certifications. On the contrary, all the users we interviewed testified to the value of credentialing. Certified workers are safer, several said. They're more productive. There's less rework required on construction jobs that hire workers with credentials. Manufacturing scrap rates are lower. Automotive repair customers complain less. Employees are happier—proud of their mastery and more engaged at work.[92]

Perhaps most significant, executives and hiring managers seemed confident that the certifications they rely on reflect skills in demand in their industry. They also seemed convinced, one or two quibbles aside, that their sector's credentialing body stays up to date, keeping abreast of market trends and changing technology.

This confidence was partly about process. The employers we interviewed trust the process their sector's credentialing body uses to develop and update certifications. Many have participated in the consensus-driven deliberations that credentialers rely on to write tests. Others have been guinea pigs for beta testing or given feedback in response to questions from a credentialing body. "They do their due diligence," said one hiring manager.[93] "We know they're keeping current," said another, "because we're part of the process."[94]

Other employers spoke from their own experience training and overseeing workers. Few of the firms we visited are new adopters. Many have relied on their industry's credentialing system for years if not decades, and they know what the tests can and cannot tell them. None look to certification as a

measure of experience; few expect certified workers to have advanced skills. But most of the employers we interviewed had little doubt that the tests measure what they claim to measure.

"Machining is not subjective," said one hiring manager. "It's black and white. You either can perform or you can't."[95] And after years of hiring certified workers, most of the employers we visited had seen the tests line up with what they saw on the job.

If anything, many of the employers we spoke with seemed to look to certification tests for an objective check on their own perceptions. Several talked about using industry-wide standards to "verify" their workers' skills.[96] Others see the tests as a means of "validating" in-house training.[97] Several construction contractors used a medical analogy: NCCER tests provide a "prescription" to guide training and promotion.[98] Like a precision tool, certification "takes the guesswork out of hiring" and offers "reliable, third-party proof" that employers can take to clients and owners.[99]

"These are evidence-based industry standards," one director of workforce development explained. "We have a lot of confidence that our training, all of it based on NCCER curriculum, is teaching the right things."[100]

Bottom line: asked for proof of ROI, the employers in our sample struggled to answer, and they provided no verifiable data on the value of industry credentialing. Most of what they offered was anecdotal evidence and declarations of faith. Yet several also pointed to practice at their firms—the stakes and risks for the company. "We're promoting and paying people on the basis of these tests," one manager said. "What better evidence that we believe in them?"[101]

RECOMMENDATIONS FOR POLICY

Industry certifications are the educational equivalent of an emerging technology—relatively new, full of promise, not yet widely adopted and still, as a tool to upgrade skills and improve labor market signaling, a work in progress.

Will the new credentialing live up to its promise as a better bridge from school to work? It's too soon to say.

Certifications are adding labor market value in a number of other ways. They're making it easier for employers to provide training. They're being used to structure the upskilling offered on the job at many companies. They're helping to upgrade not just workers, but also jobs—encouraging firms in several industries to pursue high-road employment strategies.

But industry credentialing is not yet a reliable or widely used tool for screening job applicants—so few potential candidates have credentials that no employers in our sample see them as a must-have requirement for new hires. At best, among the employers we interviewed, certifications are a plus factor in the hiring process.

Nor is this the only issue that must be addressed if certifications are to live up to their potential. In a vast and growing universe of industry credentials, only a small percentage have currency among employers. As we found in our interviews, companies that have not adopted certifications are often ill-informed and confused about basic facts. Perhaps most troubling is the lack of data about reach and outcomes. Like an emerging technology, credentials are taking off—but largely without quality assurance.

Employers, educators, students, job seekers, certifying bodies and policymakers: all can help address these challenges. The work ahead falls into three broad categories.

Refining the tool. Many of the two dozen employers we interviewed, users and nonusers, had suggestions about improving the credentials in their industry.

Complaints started with reach. There is no NCCER certification for roofing, for example. Some commercial contractors feel NCCER curriculum is so geared toward industrial construction that it's of relatively little use to other, nonindustrial firms. Some employers want more curriculum in Spanish. One automotive executive had quibbles about the ASE timeline for introducing new tests—extending certifications to new technologies such as hybrids and electric cars. But these were isolated voices and, for the most part, minor complaints.

More significant and all but universal in our sample: employers want the certifications in their industry to do a better job of validating hands-on skill—not just theoretical knowledge or a project completed for a test, but actual performance on the job. ASE's multiple choice exams include no hands-on component. NCCER offers performance assessments, but few employers feel they capture how employees handle themselves in the field. And NIMS is skewed overwhelmingly toward entry-level test takers—of no use to employers seeking to evaluate experienced workers.

Employers want certifications to do a better job of validating hands-on skill.

This is a task that falls primarily to certifying bodies—NIMS, ASE, NCCER and others. But industry stakeholders and policymakers can also make a difference. In our experience, industry credentialing bodies are sharply attuned to demand from employers in the sector they represent, and companies in all three sectors we explored want the certifying body in their industry to extend its reach, adding capacity to judge hands-on skill and workers' performance on the job.

Encouraging broader use. Our interviews left little doubt about the biggest barrier to wider use of certifications as a hiring tool: so few job applicants today have industry credentials that it would be self-defeating for many firms to count on them as a way of judging candidates.

Insufficient uptake isn't the only limiting factor. No matter how good the credentials or what they aim to measure, employers in exacting technical fields still want to verify job seekers' skills for themselves, with their own tests, formal or informal.

Does the new hire's technical prowess meet the firm's specifications? Can a craftsman perform an X-ray weld—meaning even an X-ray can find no flaw in the product? Can the machinist mill to a tolerance of plus or minus 0.001 inch? As long as clients' expectations—or safety or liability—are on the line, employers will want to confirm workers' skills with their own hands-on assessments.

Still, it was clear from our interviews that if more job applicants had certifications, many more employers in all three industries would rely on them to make decisions about hiring. It's a version of the network effect, as true of certifications as of social media: a larger number of users enhances the value of the network.

There's also a reinforcing loop. If employers saw more job seekers with certifications, firms would be more inclined to ask for them in job postings. And if job seekers knew that companies were likely to request credentials, students would be more inclined to take and pass credentialing tests.

Employers, educators and policymakers can all make a difference in this realm, increasing the value of industry credentialing by spurring broader uptake.

Employers who value industry credentialing can start by asking for it more routinely in job postings—even if for now, a certification is no more than a plus factor in the hiring process.

Educators can do more to incorporate in-demand certifications in education and training. Many high schools, colleges and job training programs are moving in this direction. But others hesitate, and much more can be done, including making provision for students to get academic credit for certifications earned on the job.

If employers saw more job seekers with certifications, firms would be more inclined to ask for them in job postings.

The challenge for policy: how to spur broader uptake without interfering in the credentialing marketplace? Few employers or employer associations want to see government picking winners and losers among credentials. Many states are experimenting with mechanisms to determine which certifications have labor market value; most use some combination of economic data about growing industries and consultation with employers who rely on credentialing. But this is still an imperfect science, and state certification lists vary in quality.

Also an open question: what are the best government tools to spur broader uptake of in-demand credentials? Most states with certification lists use them to determine which existing programs—high school, college or job training—should receive funding already allocated for education and training. But should government, state or federal, set aside additional funds to encourage the spread of industry certification? And if so, how should it be disbursed?

Most taxpayers and policymakers are comfortable

with government funding for educational institutions. There's less consensus around using public funds to encourage employers to offer training. And although there has recently been some discussion of government assistance for credentialing bodies, the idea has yet to gain traction among state or federal lawmakers.[102]

This is another area ripe for experimentation—perhaps competitive grant opportunities or pilot programs—combined with rigorous evaluation of what does and doesn't work to spur companies to spend more on training and encourage broader uptake of industry credentials.

Quality control. Also critical if industry credentialing is to deliver on its promise: better information and quality assurance. Employer uptake is one measure of the value of a certification, but it cannot and should not be the last word.

What's needed starts with information about reach: data on uptake by employers, educators and job seekers. Private-sector and nonprofit entities—firms like Burning Glass and the web platform Credential Engine—are pioneering new metrics and ways of making information available. But ultimately, surely, this is a job for government. State and federal authorities spare no effort in tracking credential attainment by students at traditional academic institutions. Why should job-focused education and training be different?

Educational institutions and training providers that receive public funding should be required to report certification attainment, and policymakers should experiment with incentives for credentialing bodies. As is, most of these entities collect meager data, if any, and they are hesitant to share what they know—they see it as proprietary information. This needs to change, albeit in ways that take account of certifiers' concerns about privacy. Certainly, if policymakers were to allocate funding to help credentialing bodies expand their reach, these funds should come with reporting requirements.

Certifying bodies collect meager data, if any, and most are hesitant to share what they know.

The second challenge, more difficult still, is quality assurance. Do certifications reflect skills in demand in the labor market? Do they lead to better employment outcomes—do certified workers land better jobs and earn higher wages? What's the ROI for employers?

Quality assurance for academic institutions measures value primarily with inputs. Are professors qualified? Is curriculum up to date? Are facilities and equipment appropriate? Some academic researchers and industry groups have taken a similar approach to certification, outlining what they see as the optimum processes for developing and updating industry credentialing.[103]

No doubt, there's a role for this kind of input-driven quality assurance. But when the desired outcomes are as clear as they are for certifications—better jobs, higher pay, more productive workers—surely it's as valuable, if not more so, to track and publish outcomes.

This too must be a joint effort. Credentialing bodies, educators and state and federal government all have a role to play in collecting information and making it available. As with other workforce programs, the most reliable way to assess the value of credentialing would be matching data about learners—in this case, certified workers—with data about labor market outcomes gathered from employers. Both state and federal authorities collect ample labor market data of this kind, but the federal government has been reluctant to use the information to assess education and training. This too must change.

Certification cannot be expected to provide a better bridge from school to work unless learners have enough information to compare their options and make choices—choices about careers, choices among certifications or choices between industry credentialing and traditional academic awards.

Conclusion

Taken together, the two dozen interviews that form the basis for this study tell an encouraging story. Industry certification is more than a distant promise—the promise is giving rise to a new reality.

Employers in the three sectors we explored see competency-based credentials as an important tool. They are picking up the tool and finding ways to use it—sometimes as a standard-setting body as originally envisioned and sometimes in their own creative fashion.

Despite the confusing welter of certifications, the employers we interviewed don't seem overwhelmed by options. A significant number in all three sectors have found ways to navigate the terrain, and those that have chosen to adopt their industry's dominant certification are reaping benefits—smarter hires, more skilled workers and more productive workplaces. By and large, they also appear to be producing better-quality goods and services.

More research is needed—much more. This study is just a beginning.

But what's needed goes beyond research. Even the best, most useful tool is only as good as the scaffolding around it: in this case, public awareness, marketing, broader uptake by employers, wider use among educators, a larger universe of certified job seekers, more extensive outcomes data and a system of standardized quality assurance.

The relatively early adopters interviewed for this study point the way forward. But they alone cannot build a better bridge from school to work. That remains a challenge for the rest of us.

APPENDIX

INTERVIEWS

Accurate Marking and Manufacturing
Ryan Mulraney, sales manager
New Kensington, PA

Automotive Service Excellence Education Foundation
Patricia Serratore, president
Leesburg, VA

Bechtel Construction
Bob Deatherage, vice president of industrial operations
Alachua, FL

Bridgestone Retail Operations
Chris Blanchette, director of operations
Telephone

Casey Industrial
Jeff Rodenberg, director of training
Alachua, FL

Chamberlin Roofing and Waterproofing
Art Canales, executive vice president
Thomas Hernandez, executive director of human resources
Houston, TX

Cianbro Corporation
Jonathan Sacks, transmission and distribution training manager
Alachua, FL

CompTIA
Randy Gross, chief information officer and senior vice president for certification operations
Liz Wannemacher, vice president of B2B marketing
Teresa Sears, senior director of product management for skills certification
Steven Ostrowski, corporate communications director
Downers Grove, IL

Elizabeth Companies
Cheryl Ragan, human resources manager
McKeesport, PA

Firm Automotive
John Firm, owner operator
Fort Worth, TX

Fluor Corporation
Dean Hamrick, director of human resources
Alachua, FL

Fort Worth Tire and Service
Sam Timmons, president
Eddie Reason, head mechanic
Fort Worth, TX

The Haskell Company
Boyd Worsham, vice president
Alachua, FL

ISC Constructors
Jerry Rispone, president and chief executive officer
Ronnie Gulino, corporate training manager
Pete LeRoy, safety manager
Baton Rouge, LA, and Alachua, FL

Jacobs Engineering
Matthew Clark, director of workforce development
Houston, TX

Karsten Interior Services
Dan Karsten, president and chief executive officer
Todd Fry, chief operational officer and chief financial officer
Jose Castaneda, general superintendent
Houston, TX

Louden Motorcar Services Inc.
Steve Louden, president
Kerrville, TX

Marek
Sabra Phillips, director of talent development
Houston, TX

National Center for Construction Education and Research
Don Whyte, president and chief executive officer
Steve Greene, vice president
Katrina Kersch, chief operations officer
Tim Johnson, senior director of government affairs
Mark Thomas, senior projects manager
Alachua, FL, and Arlington, VA

National Institute for Automotive Service Excellence
Mike Coley, senior vice president
Leesburg, VA

National Institute for Metalworking Skills
Montez King, executive director
Fairfax, VA

NN Inc.
Jenny Popowicz, human resources manager
Telephone

Oberg Industries
Greg Chambers, director of corporate compliance
Freeport, PA

Oxford Builders
William Sanchez, founder and chairman
Selle Evans, president
Houston, TX

Penn United Technologies
Scott Covert, training coordinator
Cabot, PA

Tommy's Shop
Tommy Francks, owner operator
Fort Worth, TX

Toyota Motor North America
Joseph Myers, senior strategic planning analyst
Plano, TX

Wagner Machine Inc.
Courtney Wagner, president
Norton, OH

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67. The section that follows draws on interviews with 18 employers, nine at companies that rely on industry certifications when hiring or promoting workers, and nine from firms that do not look to certifications. The author interviewed representatives of six employers in the automotive repair industry: Chris Blanchette (director of operations, Bridgestone Retail Operations), phone interview, August 23, 2018; John Firm (owner operator, Firm Automotive), Fort Worth, TX, November 2, 2018; Tommy Francks (owner operator, Tommy's Shop), Fort Worth, TX, November 5, 2018; Steve Louden (president, Louden Motorcar Services Inc.), Kerrville, TX, August 17, 2018; Joseph Myers (senior strategic planning analyst, Toyota Motor North America), Plano, TX, November 2, 2018; and Sam Timmons (president, Fort Worth Tire and Service) and Eddie Reason (head mechanic, Fort Worth Tire and Service), Fort Worth, TX, November 5, 2018. The author interviewed representatives of six employers in the construction industry: Art Canales (executive vice president, Chamberlin Roofing and Waterproofing) and Thomas Hernandez (executive director of human resources, Chamberlin Roofing and Waterproofing), Houston, TX, August 20, 2018; Jose Castaneda (general superintendent, Karsten Interior Services), Todd Fry (chief operational officer and chief financial officer, Karsten Interior Services) and Dan Karsten (president and chief executive officer, Karsten Interior Services), Houston, TX, August 21, 2018; Matthew Clark (director of workforce development, Jacobs Engineering), Houston, TX, August 20, 2018; Sabra Phillips (director of talent development, Marek), Houston, TX, August 20, 2018; Jerry Rispone (president and chief executive officer, ISC Constructors) and Ronnie Gulino (corporate training manager, ISC Constructors), Baton Rouge, LA, August 22, 2018; and William Sanchez (founder and chairman, Oxford Builders) and Selle Evans (president, Oxford Builders), Houston, TX, August 21, 2018. The author interviewed representatives of six employers in the precision manufacturing industry: Greg Chambers (director of corporate compliance, Oberg Industries), Freeport, PA, August 27, 2018; Scott Covert (training coordinator, Penn United Technologies), Cabot, PA, August 27, 2018; Ryan Mulraney (sales manager, Accurate Marking and Manufacturing), New Kensington, PA, August 28, 2018; Jenny Popowicz (human resources manager, NN Inc.), phone interview, March 15, 2019; Cheryl Ragan (human resources manager, Elizabeth Companies), McKeesport, PA, August 28, 2018; and Courtney Wagner (president, Wagner Machine Inc.), Norton, OH, August 29, 2018.

68. In addition to the 18 employers in the sample examined in the study, the author spoke with representatives of six large industrial construction firms that are members of the National Center for Construction Education and Research workforce development committee: Rodenberg (Casey Industrial); and Bob Deatherage (vice president of industrial relations, Bechtel Construction), Dean Hamrick (director of human resources, Fluor Corporation), Pete LeRoy (safety manager, ISC Constructors), Jonathan Sacks (transmission and distribution training manager, Cianbro Corporation) and Boyd Worsham (vice president, the Haskell Company), Alachua, FL, October 4, 2017.

69. Just prior to publication of this paper, Jacobs sold part of the company, including its industrial maintenance capacity, to the global Australia-based engineering firm Worley.

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