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Portable, Stackable Credentials

A New Education Model for

Industry-Specific Career Pathways

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Introduction

The United States spends over $400 billion a year on post-secondary education.[1] By most measures, the country is not getting a good return on this investment. Too many U.S. students emerge from our secondary and post-secondary educational institutions without the knowledge, skills, or credentials necessary to meet the challenges of the 21st century's increasingly global and technology-based jobs market.

As the world's labor markets evolve, so do the demands on its educational systems. This paper describes the nature of the challenges we are facing and highlights current innovations and models—around the world and in the U.S.— that suggest how a new system of well-designed career pathways could address more effectively the demand-side needs of employers and the supply-side needs of individual workers. At the core of such a system are portable and stackable credentials that enable students of all ages to build careers with family-sustaining, middle class incomes. In such a system, students have the opportunity to both learn and earn by acquiring shorter term credentials with clear labor market value even as they continue to build on these to access more advanced jobs and higher wages. And employers, educational institutions, and students can have confidence that the credentials they are working towards are recognized across the country and perhaps even around the world.

Innovators in education, business, and the government have begun to invent new ways of doing business. This paper examines some of these new models, and concludes with a call to action for educational institutions, employers, and policymakers to come together to build on these beginnings and design a system of portable, stackable credentials embedded in transparent, more easily navigable career pathways.

Supply and Demand in Today's Labor Market

A 2010 survey of 450 CEOs and 751 post-secondary education leaders found that business leaders experience high levels of frustration when it comes to hiring. Despite the fact that U.S. unemployment was around 10% at the time of the survey, 53% of business leaders said that their companies were facing a very or fairly major challenge in recruiting non-managerial employees with the skills, training, and education their companies required. The challenge was even greater for the heads of smaller companies; 67% of these leaders said finding the right talent was difficult.[2]

The fact is, America and the world's labor markets are changing, requiring more employees who have at least some post-secondary education or training. In 1973, as the authors of *Pathways to Prosperity* note, nearly 72% of the labor market comprised people with a high school diploma or less; by 2018, 63% of

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[1] www.gse.harvard.edu/news_events/features/2011/Pathways_to_Prosperity_Feb2011.pdf

[2] John Bridgeland, Jessica Milano, Elyse Rosenblum, "Across the Great Divide: Perspectives of CEOs and College Presidents on America's Higher Education and Skills Gap" Civic Enterprises, Corporate Voices for Working Families, in association with The Institute for a Competitive Workforce, U.S. Chamber of Commerce and Peter D. Hart Research Associates, (March 2011).

American jobs will require some post-secondary education or training, with nearly one-third of all jobs available to those with an associate's degree.[3]

In 1973, 60% of America's high school graduates could earn a middle-class living.[4] But according to *Enterprising Pathways,* "by 2007, this picture had changed beyond recognition. While the total number of jobs in America had grown by 63 million, the number of jobs held by people with no post-secondary education had actually fallen by some 2 million jobs. Thus, over the past third of a century, all of the net job growth in America has been generated by positions that require at least some post-secondary education."[5]

In addition, there has been a sea change in the job market since the 1970s. The jobs once considered "professional" that might only require a four-year B.A. or B.S. often involve obtaining an advanced degree today. In addition, the jobs that were once considered manual labor occupations now require certain advanced and often college level skills in areas such as computing, math and biology.

There are nearly 30 million jobs available in the U.S. today that pay middle-class earnings but don't require a bachelor's degree. These "middle-skill" occupations, according to the Georgetown University Center for Education and the Workplace (CEW), include electricians, construction managers, dental hygienists, paralegals, and police officers. "While these jobs may not be as prestigious as those filled by B.A. holders," the CEW report says, "they pay a significant premium over many jobs open to those with just a high school degree." They pay, on average, $35,000 or more per year, while some pay significantly more. Nearly 10 million jobs pay upwards of $50,000 a year, and 3.6 million pay more than $75,000.[6] More surprisingly, they pay more than many of the jobs held by those with a bachelor's degree. In fact, 27% of people with post-secondary licenses or certificates—credentials short of an associate's degree—earn more than the average bachelor's degree recipient.

There are numerous job seekers who would like to be able to enter these fields. Attainment of sub-baccalaureate credentials has increased; the number of occupational certificates awarded has skyrocketed more than 800% over the past 30 years, according to the CEW – but not enough to satisfy employer demand.

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[3] William C. Symonds, Robert B. Schwartz and Ronald Ferguson, "Pathways to Prosperity, Meeting the Challenge of Preparing Young Americans for the 21st Century," Harvard Graduate School of Education, (February 2011).
[4] Anthony J. Carnevale, Nicole Smith, Jeff Strohl, "Help Wanted: Projections of Jobs and Education Requirements Through 2018: Executive Summary" Washington, DC: Center for Education and the Workforce, (June 15, 2010).
[5] J. Bridgeland, S. Litow, T. Mason-Elder, and G. Suh, "Enterprising Pathways: Toward a National Plan of Action for Career and Technical Education," IBM Corporation and Civic Enterprises, Presented at the Opportunity National Summit (September 2012).
[6] Anthony P. Carnevale, Andrew Hanson, and Tamara Jayasundera, "Career and Technical Education: Five Ways that Pay Along the Way to the B.A.," Washington, D.C.: Georgetown University Center on Education and the Workforce, (2012).

For many potential workers, these credentials, and the jobs they lead to, are out of reach. There are currently 93 million Americans – over 40% of the nation's adult population – who lack the literacy levels necessary to take college-level, credit-bearing coursework.[7] Current education and training programs discourage all but the most determined low-skilled adults from completing a path to college, and few financial incentives would lead them to invest the time needed to become eligible for post-secondary education.[8]

The barriers to developing a highly skilled workforce begin in our secondary system. Only 34% of U.S. eighth grade students achieved an assessment of "proficient" or higher in a nationwide math test in 2009. That same year, U.S. high school students taking an international assessment exam ranked 13th behind industrialized nations in science and 17th in math.[9] Despite some recent progress, the U.S. continues to face a dropout crisis. Twenty-five percent of all students – and 60% of non-white students – leave high school before graduation.[10]

It is unsurprising, then, that in the U.S. post-secondary education system:

- One out of every three college students in a four-year college or university must enroll in at least one, non-credit remediation class to perform successfully at the college level, while nearly one out of every two community college students (43%) must do so;[11]
- Of those students at four-year colleges enrolled in remedial reading and math classes, only 17% (reading) and 27% (math) will graduate, while fewer than one in four community college students overall will earn a certificate or degree within eight years;[12]
- Only about half (56%) of students enrolled in a four-year college earn a bachelor's degree within six years, and fewer than one in three community college students (30%) obtain an associate's degree within three years;[13] and
- College degree attainment numbers only get worse for U.S. minority group students, with only 30% of young African Americans (mid-20s) in the U.S. holding an associate's degree or higher, while less than 20% of Latinos of similar age do.[14]

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[7] http://nces.ed.gov/naal/
[8] Barbara Endel, Nate Anderson, and Jeremy Kelley, "Achieving Ambitious Goals: Case Studies of Scaling-Up Programs for Advancing Low-Skilled Adults, Jobs for the Future," (May 2011).
[9] "Change the Equation, Why STEM?" http://changetheequation.org/why-stem (August 2012).
[10] R. Balfanz, J. Bridgeland, M. Bruce, J. Hornig Fox, "Building a Grad Nation: Progress and Challenge in Ending the High School Dropout Epidemic," (Alliance for Excellent Education, America's Promise Alliance, Civic Enterprises, and the Everyone Graduates Center at Johns Hopkins University, (March 19, 2012).
[11] "Enterprising Pathways," ob. cit.
[12] National Conference of State Legislatures, Improving College Completion - Reforming Remedial Education, www.ncsl.org/issues-research/educ/improving-college-completion-reforming-remedial.aspx (August 2012).
[13] Graduation rates based on 2006 data for the National Center for Higher Education Management Systems and the National Center for Education Statistics/ Integrated Post-secondary Education Data System (NCES/IPEDS).
[14] The College Completion Agenda: 2010 Progress Report, College Board.

Part of this problem stems from the fact that many students go into post-secondary education not only ill-prepared, but with minimal career goals, and a lack of understanding of their options. As the authors of the Harvard *Pathways to Prosperity* report write, "a narrowly defined 'college for all' goal—one that does not include a much stronger focus on career-oriented programs that lead to occupational credentials—seems doomed to fail."[15] The need for more career-focused pathways is echoed by research from the Community College Research Center, which suggests that enrolling students in defined programs of study *as early as possible* can boost retention and completion rates.[16]

According to a recent report by Complete College America (CCA), a national nonprofit dedicated to increasing the number of Americans with college degrees or "quality career certificates,"[17] many of the 1.7 million students who arrive at college needing remediation courses each year fail to graduate.[18] The CCA report highlights other studies and data that suggest states and students get very little for the more than $3 billion they spend annually on remediation efforts.[19] Fewer than 10% of community college freshmen taking remediation will graduate within three years, according to CCA, and only 35% of four-year college freshmen taking such courses will graduate within six years.

The failure of the U.S. K-12 education system to create and promote alternative pathways to family-sustaining income, including post-secondary training outside the traditional four-year college system, has no doubt contributed to the unacceptably high dropout rate in the U.S., where 1.2 million students leave high school every year without earning a diploma." It is long past time that we broaden the range of high quality pathways that we offer to our young people beginning in high school," write the authors of *Pathways to Prosperity*. "The lessons from other countries strongly suggest that this might be the single most promising strategy for greatly increasing the percentage of young adults who earn a post-secondary degree or credential that prepares them to embark on a meaningful career."

The Case for A Portable, Stackable Credentialing System

Clearly, there are mutual needs between businesses and educational institutions, as well as between students and employers. Our current system, for a multitude of reasons, is unable to produce the workforce that employers are demanding, nor is it a good fit for the needs of today's students, who in many cases are older than the traditional college population, and need to balance the demands of work,

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[15] Pathways to Prosperity, ob. cit.
[16] E.g., see: Davis Jenkins & Sung-Woo Cho. 2012. "Get With the Program: Accelerating Community College Students' Entry into and Completion of Programs of Study. New York, NY: Community College Resource Center" (http://ccrc.tc.columbia.edu/Publication.asp?UID=885); and Center for Community College Student Engagement," (2012). "A Matter of Degrees: Promising Practices for Community College Student Success (A First Look)." Austin, TX: The University of Texas at Austin, Community College Leadership Program. (http://www.ccsse.org/center/resources/docs/publications/A_Matter_of_Degrees_02-02-12.pdf).
[17] www.completecollege.org/about/
[18] National Center for Education Statistics. Digest of Education Statistics. Table 241. (2010).
[19] Alliance for Excellent Education. "Saving Now and Saving Later: How High School Reform Can Reduce the Nation's Wasted Remediation Dollars," (May 2011).

school, and family. Many in the business community are also frustrated by the time it takes for community colleges and other training institutions to adapt curricula to individual industry needs. Far too often, the educational offerings at post-secondary institutions lag behind the labor needs in a community.

Even traditional-age students and parents are beginning to question the wisdom of incurring crushing student loan debt for college degrees that may never be earned, or – even when they are – turn out to be insufficient for obtaining a well-paying job. Earning a baccalaureate degree in an area of interest might seem an ideal pathway to a career, but if that degree is in a field where jobs are decreasing, or a limiting niche market, then it carries little weight in the labor market. The business community is also taking an active and even a proactive role in the education reform debate.

As Jim Clifton, author of *The Coming Jobs War*, has argued, the next worldwide challenge is the "war for good jobs," a challenge he believes will be met only when businesses and educational institutions collaborate to not only fill jobs, but make jobs[20]. As a result, job-specific education and training will be essential for students who will not go on to college or who will go directly from high school to the workforce. It must also be a key priority for business leaders who want to ensure a steady pipeline of trained, work-ready employees to fill the jobs of the 21st century.

"To create better outcomes for workers and economies," a recent McKinsey study concludes, "policymakers and business leaders across the globe will need to find ways to vastly improve their capacity to provide job-relevant education and training. And, in both developing and advanced economies, new approaches to job creation for low and middle-skill workers will be required."[21]

However, there is also a lack of understanding and communication between – not just the heretofore-separate worlds of education and business – but also different areas of the education world (K-12, college and adult education – both public and private). Each has its own unique language and way of doing things, making it difficult for all stakeholders to arrive at a vocational or career and technical education system that can meet the needs of 21st century employers, education providers, and the students and workers seeking to acquire education and training credentials that are both "portable and stackable."

The situation is difficult, but not impossible. Things are beginning to change and move in the right direction, with many people in both education and business advocating for and taking strong action to develop educational career pathways that will provide the people most at risk of dropping out of high school or failing to graduate college with the opportunities they need to obtain and build upon such credentials.

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[20] Clifton, Jim. *The Coming Jobs War*, (NY: Gallup Press, 2011).
[21] Richard Dobbs, Anu Madgvkar, Dominic Barton, Eric Labaye, James Manyika, Charles Roxburgh, Susan Lund and Siddarth Madhav, "The World at Work: Jobs, Pay and Skills for 3.5 Billion People" McKinsey Global Institute, (June, 2012).

These credentials would be:

- **Portable,** so that they are trusted by employers and educational institutions throughout the country and perhaps even the world. To accomplish this, they would be independently verified or accredited, as in the case of "Qualification Frameworks" that are currently being adopted around the world in such places as India, the European Commission, the Philippines, and Australia. According to the recent McKinsey report cited above[22], by adopting innovative technologies, educational institutions can now reach many more students at a much lower cost. Online learning offers the promise of providing millions of students access to the best teachers and teaching systems, and can be customized to suit individual learning objectives.
- **Stackable**, so that students are able to earn shorter-term credentials with clear labor market value and then build on them to access more advanced jobs and higher wages. These stackable post-secondary certificates and credentials would offer an accelerated entrance to the job market, which is essential for students who need to work while in school and may not be able to wait four to six years to finally earn a marketable credential. "The majority (51%) of post-secondary certificate programs take less than a year of instructional time to complete, while 41% take between one and two years."[23] Stackable credentials also increase the persistence and motivation of the learner by offering smaller, yet recognized subgoals.
- **Part of a Career Pathways System,** with clear education, training strategies, mechanisms, and supports for moving from the acquisition of core skills and credentials for job entry on through increasingly higher levels of relevant skills and credentials to advance to higher levels of employment within sectors and industries.

Pathways to careers are a good metaphor for this new system of portable, stackable career credentials; a pathway that can lead to a secure, family-sustaining career and a solidly middle-class life-style for those who might otherwise not make it – rather than a "bridge," as the discredited remediation system has been called by CCA and others. A bridge, after all, is an artifact used by all comers to help people over an obstacle – a river or chasm – some impediment that blocks the way. But a career pathway can be an individualized course of study and training that builds upon a person's unique talents and strengths at their own pace, incenting them along the way to continue onward and upward to increasing rewards.

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[22] Ibid.
[23] Anthony P. Carnevale "Career and Technical Education: Five Ways that Pay Along the Way to the B.A.", et. al., ob. cit.

Certificates, Certifications, Post-Secondary Degrees, Licenses and Credentials What's the Difference?

The skills mismatch is currently made more complicated by the fact that the U.S. lacks a coherent, transparent system for earning and awarding post-secondary credentials.

The array of possible credentials includes diplomas, occupational certificates, certifications, degrees, occupational licenses, apprenticeship certificates, and specific skills certificates and certifications within one or more industries or occupations.[24] Credentials can be acquired through a variety of means: employer-based training, industry-based certifications, apprenticeships, post-secondary certificates and associate's degrees (which often include or lead to certificates). [25]

Jim Henderson, vice president of certification testing and development firm Castle Worldwide, says that the distinctions between a license, a registration and a certificate can easily become blurred. "We call them 'registered nurses,'" Henderson explains, "but you can't be a registered nurse without being licensed. We call them 'certified teachers,' but that also is [a license], because you can't teach in a public school without meeting [state] license[ing] requirements."[26]

If this sounds confusing, it's because it is. All parties -- students, educators and employers – would be better served by a common understanding of the labor market value of any given credential.

A license refers to documentation granted by a governmental agency, typically at the state level, that confirms the license holder has met the state standards for practicing a particular profession.[27] A license is required before one can work in certain occupations. Licensure is the most restrictive form of professional and occupational regulation. If you do not have a license to practice your profession in the state in which you would like to ply your trade, you cannot do so legally. Educators, for example, must be licensed to teach in the K-12 system by the state in which they work. If a teacher moves to a different state, he/she must take the licensing exam offered by his/her new state.

Industry certification is less tightly restricted. Certification typically refers to documentation by exam or a record of work-related skill, verified by an external organization (e.g., an industry association) that the holder of the certification has demonstrated a level of skill attainment that a potential or current employer would value.

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[24] U.S. Department of Labor TEGL 15-10
[25] Anthony P. Carnevale and Donna M. Desrochers, "Help Wanted Credentials Required: Community Colleges in the Knowledge Economy, American Association of Community Colleges," (2001).
[26] www.isa.org/Content/NavigationMenu/Products_and_Services/Certification3/Certified_Automation_Professional1/CAP_Newsletter/200406CAPNewsletter.pdf
[27] Commercial airline and other pilots in the U.S., for example, must obtain their licenses from the Federal Aviation Administration, and the Coast Guard issues licenses for some shore and inland water transportation occupations.

There is significant confusion about the difference between industry-certification, as defined above, and certificates. "The essential difference," explains Anthony P. Carnevale of CEW, "is that certificates are earned through seat time in a classroom, and industry-based certifications are awarded based on performance on a test, irrespective of where the learning occurs."[28]

Certificates are granted by educational institutions, reflecting completion of a curriculum designed to provide those who earn the certificate with qualifications for success in particular occupations. Certificates granted by post-secondary institutions tend to require fewer hours of coursework and a narrower curriculum of a BA or two-year associate's degree.

In addition to credentials related to specific fields, there is also a growing interest in credentials that reflect general work readiness. This is in line with the thinking of Anthony J. Carnevale and his colleagues, who say that to be employable in today's labor market, "workers must have both content knowledge and effective workplace skills." They need to have and demonstrate expertise in their fields, as well as a comprehensive set of core career competencies. These skills and competencies include critical thinking, problem solving, teamwork, communication, and leadership and creativity. A high regard for ethical behavior and the ability to work cross-culturally also are required, as is some college education, or a vocational certificate.[29]

Three of the more common work readiness assessments/credentials are:

- The Workforce Skills Certification System of the Comprehensive Adult Student Assessment Systems together with Learning Resources, Inc.;
- The National Work Readiness Credential of the National Work Readiness Council; and
- ACT's National Career Readiness Certificate (NCRC), a job skills assessment system that measures foundational and soft skills to help employers select, hire, train, develop, and retain a high-performance workforce.[30]

What the Rest of the World Is Doing to Create More Skilled Workers

The skills gap is not just a U.S. problem. The 2012 report from the McKinsey Global Institute, mentioned above, found the economic forces that have caused skill imbalances in recent years will likely grow stronger, and that similar mismatches between the skills workers can offer and those that employers need

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[28] Anthony P. Carnevale, Stephen J. Rose, and Andrew. R. Hanson, Certificates: Gateway to Gainful Employment and College Degrees, Georgetown University Center on Education and the Workforce, (June 2012).
[29] Help Wanted, ibid.
[30] James Parker and Gail Spangenberg, "Random Acts of Progress: Certification of Readiness for Jobs and College, Council for the Advancement of Adult Literacy," (CAAL), (March 30, 2012). *[Note: This paper was funded, in part, by The McGraw-Hill Companies, Inc., and the late Harold W. McGraw, Jr., among other institutional and individual donors.]*

will begin appearing in developing countries as well. "If [recent] trends persist," the authors write, "and absent a massive global effort to improve worker skills, they are likely to do so – there will be far too few workers with the advanced skills needed to drive a high productivity economy and far too few job opportunities for low-skilled workers."

The most significant imbalances that might arise, according to the McKinsey study, include:

- A potential shortage of about 38 to 40 million high-skill workers, or 13% of the projected demand for such workers;
- A potential surplus of 90 to 95 million low-skill workers around the world, or about 10% of the supply for such workers; and
- A potential shortage of nearly 45 million medium-skill workers in developing countries, or about 15% of the demand for such workers.

In addition, the McKinsey study notes that new workers will enter the workforce at a slower pace over the next two decades, as members of the large baby boom generation continue to reach retirement age. The annual growth rate of the global workforce will fall, the authors' predict, from about 1.4% annually to 1% between now and 2030.

As a result, developing a system of industry-recognized, portable, stackable certifications is where education and business needs to focus today. This is true globally – not just in developed parts of the world, but in developing nations and emerging markets, too. And other countries have developed promising strategies to address this need – strategies the U.S. could learn from.

Consider that as many as 40% of secondary students in the nation of Austria graduate with an industry-recognized technical apprenticeship certificate.[31] Once earned, that certificate allows a recent high school graduate to go anywhere in the European Union (EU) and find work. The EU may have more than its share of economic problems lately, but education authorities and the public there do seem to understand that students with a technical passion can enjoy a career that leads to family-sustaining wages even if it does not involve a four-year college degree.

That said, it is worth pointing out that even those countries already committed to providing their young people with a first-rate career and technical education are not immune to global trends, nor are they standing still or resting on their laurels. Many countries, such as Australia, South Korea, India, Singapore,

[31] www.mutual-learning-employment.net/uploads/ModuleXtender/PeerReviews/95/Peer_Country_paper_Austria.pdf

China and the member nations of the EU, are actively seeking to formalize and validate their systems of earning and awarding occupational credentials, especially industry-recognized certificates. The goal is to ensure the certificates their citizens earn are "portable and stackable;" (i.e., widely recognized), accepted nationally or internationally, and offer clear and consistent pathways from student or apprentice to trained worker and, eventually, technical mastery of specific skills.

Qualifications Frameworks

Internationally, governments are working to create frameworks and pathways that will improve the education of their labor force. Qualification Frameworks have been, or are in the process of being, adopted by Australia, India, the European Commission, and the Philippines. As an example, the European Qualifications Framework (EQF) "acts as a translation device to make national qualifications more readable across Europe, promoting workers' and learners' mobility between countries and facilitating their lifelong learning. The core of the EQF concerns eight reference levels describing what a learner knows, understands and is able to do – 'learning outcomes'. Levels of national qualifications will be placed at one of the central reference levels, ranging from basic (Level 1) to advanced (Level 8). This will enable a much easier comparison between national qualifications and should also mean that people do not have to repeat their learning if they move to another country. The EQF applies to all types of education, training and qualifications, from school education to academic, professional and vocational. This approach shifts the focus from the traditional system that emphasizes 'learning inputs,' such as the length of a learning experience, or type of institution. It also encourages lifelong learning by promoting the validation of non-formal and informal learning."[32]

Another example of an approach to maintaining consistency across systems and countries is the Independent Organization for Standards (ISO), which just released its revised ISO/IEC 17024 standard for a personnel certification programs this past summer.[33] The new 17024 provides quality standards for bodies that certify personnel. ISO standards are often used to validate the quality of products, and they are trusted around the world. In this case, they are providing a global benchmark for a personnel certification program, ensuring such programs operate in a consistent, comparable and reliable manner worldwide.

Personnel certification has become an important element in verifying the competence of an increasingly mobile and global workforce, underscoring the value of industry-recognized credentials that can be carried across national borders. In response to this growing need, the new and improved ISO/IEC

[32] http://ec.europa.eu/education/lifelong-learning-policy/eqf_en.htm
[33] www.iso.org/iso/home/news_index/news_archive/news.htm?refid=Ref1625

International Standard 17024 seeks to provide an evaluation of conformity to the standards for certifying the competence of personnel in different occupations or professions.

Apprenticeship Systems in Europe

Apprenticeship-type systems, including dual Vocational Education and Technical (VET) programs that combine school attendance with work, are prevalent and well established in the European Member States, according to a European Commission report released in early 2012.[34] In Germany and Switzerland, for example, apprenticeship is a major element of transition from school to work for 40% to 70% of high school students and recent high school graduates.[35]

The European Union (EU) report notes that approximately 3.7 million EU students pursue strictly company-based apprenticeship studies, according to 2009 data. Another 5.7 million students attend mainly school-based VET programs that involve some compulsory work-based training. The countries with the highest numbers of VET students following apprenticeships are the largest EU countries, but Germany and Austria are significant for the impact their programs have on their societies. Approximately 70% of companies with 50 or more employees in Germany participate in the system. And, in 2009, the apprenticeship statistics of the Austrian Federal Economic Chamber detailed some 40,000 companies training as many as 132,000 apprentices. It is also significant to note that Germany enjoys a youth unemployment rate that is half the OECD average.[36]

The main German VET path is a dual system where the apprentice is trained in a commercial enterprise three or four days a week and in the vocational school for one or two days. Programs usually last three years, with some occupations only requiring two. Twenty percent of students in the German dual system return to higher education after completing the dual program. In Austria in 2006, the Vocational Training Act was amended to provide a legal basis for modularizing apprenticeships, making Austria's VET system more stackable and more responsive to industry sector needs.

"By combining practical, in-company training with theoretical instruction," the EU Commission report states, "students have the chance to acquire two qualifications at once … a vocational training qualification and an academic degree. Dual courses of study are an especially innovative, attractive and practical way of studying that has enjoyed increasing popularity" in the EU.

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[34] Apprenticeship Supply in the Member States of the European Union, Final Report, European Commission, Directorate-General for Employment, Social Affairs and Inclusion. Unit C3. (January 2012).
[35]" Career and Technical Education: Five Ways That Pay Along the Way to a B.A.," by Anthony P. Carnevale, et. al, ob. cit.
[36] McKinsey Global Institute, "The World at Work: Jobs, Pay and Skills for 3.5 Billion People. by Richard Dobbs, et. al, ob. cit.

Career Pathways in Ontario, Canada

Over the past two decades, the Government of Ontario has launched two initiatives with the aim of providing career pathways to high school students, thereby increasing the high school graduation rate.

The first initiative, the School College Work Initiative (SCWI), was launched in 1997 to "build and sustain better linkages between the college system and the secondary school system and to support expanded and improved transitions by secondary students to college." According to David Armstrong, project officer with the SCWI, "This is a strategic goal for the Government of Ontario and a high priority for the Ministry of Education and the Ministry of Training, Colleges and Universities."

The SCWI has a mandate to fund activities, programs and forums that have focused on this goal by:

- Aligning curriculum between secondary schools and colleges;
- Articulating pathways to college and apprenticeship programs for students;
- Increasing the understanding of the educational and career opportunities for students through colleges as a post-secondary destination; and
- Linking teachers in the college and secondary panels through discussion seminars, professional development and exchange, and internship opportunities.

In 2005-06, the SCWI mandate was extended to include the funding of programs to expand the availability of dual credit programs involving the two systems.

A second initiative in Ontario is the Specialist High Skills Major (SHSM) program. A SHSM is a ministry-approved specialized program that allows students to focus their learning on a specific economic sector (such as Agriculture, Energy, Health and Wellness, or Technology) while meeting the requirements to graduate from secondary school. It also assists in their transition after graduation to apprenticeship training, college, university or the workplace. Students receive SHSM's seal on their diploma when they:

- Complete a specific bundle of 8 to 10 courses in the student's selected field;
- Earn valuable industry certifications including first aid and CPR qualifications; and
- Gain important skills on the job with employers." [37]

The 2011-12 school year offered the SHSM diploma in: Agriculture; Arts and Culture; Aviation/Aerospace; Business; Construction; Energy; Environment; Forestry; Health and Wellness; Horticulture and Landscaping; Hospitality and Tourism; Information and Communications; Technology;

[37] www.edu.gov.on.ca/morestudentsuccess/SHSM.asp

Justice, Community Safety, and Emergency Services; Manufacturing; Mining; Non-profit; Sports; and Transportation.

Students who successfully complete the SHSM receive:

- An Ontario Secondary School Diploma with an embossed red seal;
- A SHSM Record documenting his/her achievement; and
- Formal recognition on his/her Ontario Student Transcript.

However, it is difficult to make comparisons among countries because of the relative impact of the social safety net in most of these countries. The ability to work in Germany or Canada is bolstered by a national health care system, so part-time work and study can be undertaken without jeopardy. Part-time work in the U.S., however, almost never provides health care, maternity leave or paid sick days, and these benefits are increasingly rare among full-time vocational work.

Australia

In Australia, the role of apprenticeships and technical training has been expanded in recent years, reaching participation levels similar to those in central European countries.[38]

Recently, the Australian government implemented funding models where the purchasing power rests with those at the end of the training pipeline – employers and industry. These "client-" or "demand-driven" models differ from "input-driven" models, where training providers are funded directly. A key goal of these models is to encourage industry to support accredited training by ensuring that the training is relevant to the client's workforce development and training needs.

An example is Australia's National Workforce Development Fund. Under this model, funding is provided by both the enterprise seeking trained workers and the Australian government, with an eye toward supporting the workforce development and business needs identified by the companies and industries involved.[39]

In addition, Australia's VETiS (Vocational Education and Training in Schools) program is offered in more than 90% of secondary schools, enrolling about 40% of eligible students. In 2010, 230,000 students were enrolled.[40]

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[38] Lerman, (2009).
[39] OECD (2012), "Better Skills, Better Jobs, Better Lives: A Strategic Approach to Skills Policies," OECD Publishing. http://dx.doi.org/10.1787/9789264177338-en
[40] "The World at Work: Jobs, Pay and Skills for 3.5 Billion People," ob. cit.

Initiatives in Asia

Similarly, in India, the National Skills Development Corporation, a public-private partnership, focuses on funding skill-building initiatives through industry skill-councils. The task of the National Skills Development Corporation is to train 500 million people in the Indian labor force by 2020.

In China, the Zhongzhi Beifang Automotive Vocational Training School is a private, for-profit company that provides automotive vocational training to as many as 100,000 students in partnership with major auto manufacturers.[41]

Challenges and Opportunities in the U.S.

For decades, students in the U.S. have been told that they must go to a four-year college. This emphasis has proven to be faulty guidance, as not all careers require a four-year college degree, nor does everyone need a baccalaureate degree to be successful. As William Symonds of *Pathways to Prosperity* notes, "the United States is increasingly an outlier in its approach to education and youth development. While we continue to overemphasize the academic, four-year-college pathway, other nations are increasingly embracing high-quality vocational education. If we hope to regain our leadership in education, we must adopt a broader approach, one that puts far more emphasis on development of a world-class, rigorous system of multiple pathways."[42]

Potential obstacles to developing a system of stackable, portable credentials in the U.S. include the following:

- U.S. education at the secondary level is driven by individual states and local districts, making it more difficult to establish a nationwide system of credentialing than it is in other countries where education is often managed and run at the federal level;
- The number of stakeholders with an interest in this issue is large and varied and includes the K-12 education community, the very different college and university post-secondary world, the even more different adult workforce career and technical education community, the business community, small business employers, students, certificate and certification grantors, teachers, professionals and parents. These are just some of the widely different groups that have a serious interest and sometimes competing interests – when it comes to how a nationwide system of trusted, portable, stackable certificates might be established and run.

[41] Ibid.
[42] "The Career Pathways Effect: Linking Education and Economic Prosperity". A joint publication of CORD and NASDCTE (October 2012).

A more pressing challenge is that the post-secondary and adult workforce training programs and certifications are also numerous and fractured, run by many different public and private entities, some of which have had little to do with each other historically – including community colleges, private trade schools, industry- and professional association-run training and certification programs. Many of the certificates offered by these entities lack any independent assessment and validation from an impartial third party, raising issues of trust.

When it comes to independent evaluation and accreditation, this is a key issue for the ultimate success of any system of portable, stackable certificates or other credentials. Anthony Carnevale writes that as "alternative models in higher education – such as do-it-yourself (DIY) education, competency-based education, and e-learning a.k.a. online education – are becoming more prevalent, the need for a reliable credentialing system has risen in tandem. This need arises because of the difficulty in evaluating the reliability of the credentials established by these alternative systems to ensure that workers have the knowledge and skills necessary to perform proficiently on the job."[43]

Despite these potential obstacles, there are excellent examples of innovative programs, initiatives, and systems that are creating new pathways to education and training – pathways that transcend the traditional barriers between secondary and post-secondary education models.

How the U.S. Departments of Education and Labor Are Already Supporting This Effort

At the federal level, both the U.S. Department of Education and the U.S. Department of Labor have taken important steps to support portable/stackable credentials and career pathways. Along with the U.S. Department of Health and Human Services, the U.S. Departments of Labor and Education issued a letter in April 2012 highlighting the joint commitment of all three agencies to "promote the use of career pathways approaches as a promising strategy to help adults acquire marketable skills and industry-recognized credentials ...."[44]

The agencies define career pathways as a "series of connected education and training strategies and support services that enable individuals to secure industry relevant certification and obtain employment … [while advancing] to higher levels of future education and employment ...."[45] The agencies also recognize the importance of a more systemic approach at the state and local level to align workforce, education, and social services in ways that result in more high-value credentials. Since 2009, the U.S. Department of Education's Office of Vocational and Adult Education (OVAE), has worked with major national associations,

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[43] Anthony P. Carnevale, Tamara Jayasundera, Andrew R. Hanson. "Career and Technical Education: Five Ways That Pay Along the Way to a B.A.," Georgetown Public Policy Institute, Center on Education and the Workforce. (Sept. 2012).
[44] www2.ed.gov/about/offices/list/ovae/ten-attachment.pdf
[45] Ibid.

organizations, and states to develop a "10 Component Framework" that sets out a clearly defined and rigorous program of study.[46]

Because The Perkins Act does not provide detailed guidelines for ensuring quality of implementation, the OVAE framework adds 10 components that states and localities can customize to fit specific educational contexts. The components are:

1. Effective legislation and policies
2. Sustained relationships among education, business, and community
3. Professional development
4. Accountability and evaluation systems
5. College and career readiness standards
6. Sequences of secondary and post-secondary courses that prevent duplication and remediation
7. Credit transfer agreements between secondary and post-secondary education systems
8. Guidance counseling and academic advisement to help students make informed decisions
9. Innovative instructional approaches that integrate academic and technical teaching and learning
10. Assessments that inform whether students are achieving the necessary knowledge and skills for post-secondary education and careers

OVAE has also just launched an initiative designed to create new pathways to education and training that transcends the traditional barriers between secondary and post-secondary education models. *Advancing Career and Technical Education (CTE) in State and Local Career Pathways Systems* will assist states in building capacity to integrate CTE Programs of Study into the development efforts of their broader Career Pathways systems. Five states will be selected to participate in this program in early 2013.

In guidance issued to state workforce agencies, the DOL's Employment and Training Administration recommends that state and local workforce agencies "encourage training providers to modularize curricula into chunked curriculum" and "smaller units, each of which is stackable and linked to other modules that culminate in an industry-recognized credential."[47] The DOL further defines a credential as stackable when "it is part of a sequence of credentials that can be accumulated over time and move an individual along a career pathway or up a career ladder."[48]

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[46] National Association of State Directors of Career Technical Education Consortium, Building Comprehensive Programs of Study through Progressive State Career Technical Education Legislation, www.careertech.org/legislation/briefs-papers.html (August 2012)
[47] U.S. Department of Labor TEGL 15-10, p. 11-12
[48] U.S. Department of Labor TEGL 15-10, Attachment 2, p. 6.

In addition to guidance, the DOL has also issued an array of web-based tools, each found on the careeronestop.org website, that can help practitioners navigate the intricacies of competency models, credentials and career pathways. Key examples include:

- *Competency Model Clearinghouse* that allows you to search for resources related to competencies, such as curriculum, assessment instruments, skill standards and certification requirements. These resources can be used to identify, develop, and customize competency models for your business, workforce investment project, and curriculum development.
- *Industry Competency Models* that include specific models of the foundation and technical competencies that are necessary in over 20 key industry sectors, ranging from Advanced Manufacturing to Information Technology. The models are designed to inform discussions among industry leaders, educators, economic developers and workforce professionals as they collaborate to develop industry-defined certifications.
- The *Certification Finder* is an online directory of third-party organizations that provides verification of skill or knowledge attainment based on generally accepted skill standards for an occupation. This directory allows you to search for certifications by keyword, by an occupation or an industry group.
- The site also contains two helpful interactive tools: the *Build a Competency Model Tool* to assist in the development of a competency model that identifies the knowledge, skills, and abilities needed to perform successfully in an industry. And, the *Build a Career Ladder/Lattice Tool* to help build career ladders/lattices that outline critical experiences individuals need to progress through a career in an industry.

The DOL has also issued comprehensive information on career pathways, including information on six key elements that drive the development of a comprehensive career pathways system, a career pathways readiness assessment tool, a career pathways toolkit and a policy paper. This suite of resources goes a long way toward building common understanding and design principles that can be adopted by states and local areas.

Another innovative initiative is the Department of Labor's TAACCCT grant program. The DOL has completed the first two years of a four year Trade Adjustment Assistance Community College and Career Training Grant Program (TAACCCT), which aims to accelerate progress for low-skilled and other workers, improve retention and achievement rates to reduce time to completion, build programs that meet industry needs, including developing career pathways, and strengthen online and technology-enabled learning. Low-skilled and other workers improve retention and achievement rates to reduce time to completion, build programs that meet industry needs, including developing career pathways, and strengthen online and technology-enabled learning.

Other innovative federal initiatives include the Department of Health and Human Services' Administration for Children and Families, which is undertaking a large-scale evaluation of career pathways programs called Innovative Strategies for Increasing Self-Sufficiency. The goal is to test promising approaches within a rigorous evaluation framework (see www.projectisis.org for more information).

National, State, and Local Models for Portable, Stackable Credentials

The K-12 Common Core educational standards were developed through collaboration across states supported by the Council of Chief State School Officers and the National Governors Association, with significant and broad input from teachers, school leaders, and national organizations. A similar effort has begun to align career and technical education standards across the U.S. - the Common Career Technical Core (CCTC) from the National Association of State Directors of Career Technical Education (NASDCTE).[49]

The Common Career Technical Core is an initiative spearheaded by state Career Technical Education directors to establish a more consistent set of standards for CTE programs of study at both the secondary and post-secondary levels. The standards cover 16 Career Clusters and define the knowledge and competencies expected of students who complete a program of study. The initiative is just getting started; the first draft was released in the summer of 2012, and adoption of the standards is voluntary, but 42 states, the District of Columbia and Palau participated in the development stage of CCTC. Similar to the development of the Common Core, the CCTC development process included input from secondary and post-secondary education as well as business and industry. Alignment proposals have recently been requested. The test for the CCTC will be whether and how it is used as a guide to quality by educators and, most important, by employers looking for higher skilled employees.

The Council of Chief State School Officers (CCSSO) has also weighed in on Career and Technical Education, particularly in terms of the future of CTE assessment. The CCSSO recognizes "two significant issues facing our nation: ensuring that more students are both college-and career-ready and addressing the need for better and more quality data to evaluate the effectiveness of career technical education programs."[50] By identifying "global competition, declining school achievement, and the skills gap," the CCSSO hopes to draw "major focus and investment in building large-scale CTE assessments that result in nationally portable credentials."

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[49] www.careertech.org/career-technical-education/cctc/info.html
[50] Council of Chief State School Officers, "The Future of Career and Technical Education (CTE) Assessment: Executive Summary" (2011).

One evolving foundational model for stackable credentials is ACT's NCRC[51], launched in 2006 to provide employers with a reliable method of assessing and predicting a job candidate's likelihood of achieving workplace success. The WorkKeys battery, which provides the "heavy lifting" for the NCRC, yields three scores: Reading for Information, Locating Information, and Applied Mathematics, which are used to award the test taker a designation of bronze, silver, gold, or platinum level achievement.

The NCRC measures problem-solving ability, critical thinking and reading skills, including the ability to understand and use work-related text. It also tests a job-seeker's ability to apply information to solve problems, uses mathematical reasoning to solve work-related problems, sets up and performs work-related math calculations, and measures other skills.

The NCRC is a portable credential, accepted and recognized in 42 states. In addition, it can serve as the first step in a series of "stackable" credentials that rise from basic, foundational skills to mastery of a particular trade, occupation or craft. The NCRC has been explicitly endorsed as a foundational and career readiness credential by: the National Association of Manufacturers (NAM); the National Center for Construction Education and Research (NCCER); and the Center for Energy Workforce Development (CEWD).[52, 53, 54]

It is not, however, accepted by all employers, which can lead to confusion about the credential's usefulness. Currently, there is no measure to show which industries in which regions use the certificate, whether it is a requirement, or if there are differences in salary or career advancement of certificate holders versus non-holders.

The NAM-Endorsed Manufacturing Skills Certification System

The NAM-Endorsed Manufacturing Skills Certification System is a system of stackable credentials applicable to all sectors in the manufacturing industry. These nationally portable, industry-recognized credentials validate the skills and competencies needed to be productive and successful in entry-level positions in any manufacturing environment. The credentialing partners that comprise the Skills Certification System are ACT, the American Welding Society, the Manufacturing Skill Standards Council, the National Institute of Metalworking Skills, and the Society of Manufacturing Engineers.

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[51] www.ACT.org/certificate
[52] National Association of Manufacturers. "About Stackable Credentials: The National Association of Manufacturers Endorsed Skills Certification System," (2010). http://institute.nam.org/page/edu_workforce_skills_cert_national_tools.
[53] National Center for Construction Education and Research, http://www.nccer.org/
[54] Center for Energy Workforce Development. "Credentialing: How Much Do You Really Know About It?," Get Into Energy Update (40), (October 2010), www.cewd.org/newsletter/CEWD%20Newsletter%20Oct2010.pdf.

The NAM-Endorsed Manufacturing Skills Certification System includes both technical and non-technical skills, ensuring that individuals have both the personal and professional skills necessary for advanced manufacturing. The skill sets, based on the industry-developed Advanced Manufacturing Competency Model, include four tiers of manufacturing competencies:

1. **Personal effectiveness:** Will they show up on time, be ready for work, and be able to work in teams?
2. **Essential academic skills in reading, writing, math, and using and locating information:** Can they communicate effectively and interpret key instructions?
3. **Core manufacturing competencies:** Do they understand the basics of safety, quality assurance and continuous improvement, or lean manufacturing?
4. **Key technical skills for the production line, welding, machining and metalforming or CNC:** Do they have high-tech skills consistent with the product line's needs and basic technology skills related to manufacturing processes?

The certifications are aligned to secondary and post-secondary programs of study, giving students the basic education along with the industry-relevant training they need for entry-level employment, advancement, or to pursue a degree.

The NAM-Endorsed Manufacturing Skills Certification System is currently being deployed in community colleges across the country. Four pilot projects in Ohio, North Carolina, Texas, and Washington have set a national precedent for the deployment of the program in all 50 states. As of September 2010, a total of 25 states have been in strategic planning for deployment of the NAM-Endorsed Manufacturing Skills Certification System.

P-TECH: Pathways in Technology Early College High School

An example of a promising practice at the secondary level is P-TECH, a collaboration among the New York City Department of Education, The City University of New York, New York City College of Technology (City Tech), and IBM. P-TECH offers skills-based career preparation in the IT field to students in grades nine through a two-year post-secondary program, adding the powerful component of industry involvement. The collaborators' intent was to create an innovative, replicable model for education adapted from the very successful early college high school model pioneered by Jobs for the Future (JFF).[55, 56] There is high interest among other companies in replicating the model.
P-TECH students participate in an ongoing sequenced Workplace Learning curriculum informed by current and future industry standards. This curriculum includes work-based competencies, mentoring, guest speakers, workplace visits, internships, and a capstone paid apprenticeship. To serve as an added

[55] Center for Children & Technology, "STEM Pathways to College and Careers Schools: A Development Guide," (February 2012).
[56] With partners, JFF has helped to support the expansion of over 300 early college schools around the country.

incentive to students, IBM has promised successful graduates that they will be first in line for entry-level jobs – thereby strengthening the continuum from school to college and career.

At P-TECH, minimum requirements for high-demand entry-level IT jobs have been mapped to the curriculum, serving as academic benchmarks and goals. A coalition of industry advisors ensure that P-TECH's programs align with industry needs as the IT field evolves. P-TECH's curriculum is also aligned with the Common Core standards as the foundation for learning in college – particularly higher education institutions with strong math, science and engineering programs. As part of creating the early college culture, students immediately participate in other aspects of college life and engage with college faculty and students. This kind of experience provides students with first-hand knowledge of the expectations of post-secondary college and career environments.[57]

P-TECH is a new and promising initiative. Being in its second year, it will take some time to determine whether such an integrated, skills-based career preparation program can be truly effective long-term and scalable.

Metro Early College High School

Another promising example is Columbus, Ohio's, Metro Early College High School. Metro is one of 35 STEM (Science, Technology, Engineering, Math) schools in the early college high school network developed by JFF. In partnership with Ohio State University, Metro students take general education courses taught by university faculty in STEM and other disciplines, and have a number of fieldwork experiences. "The school adjusts to the educational needs of diverse students based on where they are academically when they arrive. This allows all students to eventually master high school-level work, in part, by encouraging them to engage in complex, real-world tasks requiring STEM-based knowledge and skills."

Kentucky Community Colleges Bridges to Opportunity Initiative

Kentucky provides a good example of a statewide approach to rethinking workforce education systems. In 2002, the Ford Foundation selected the Kentucky Community & Technical College System (KCTCS) to participate in its "Community College Bridges to Opportunity Initiative," which was developed to address the fact that disadvantaged students were not being served by the current systems of post-secondary training that kept remedial education, workforce skills training and more traditional academic pursuits separate from each other.

All KCTCS colleges responded with two-year implementation plans, ultimately approving 17 pathways projects that target services for over 1,200 new and incumbent workers. In 2004, KCTCS was awarded continued support from the Ford Foundation to support the Career Pathways initiatives at the 16 college

[57] "STEM Pathways to College and Careers Schools," Ibid.

districts, providing funds for curriculum and articulation work, data collection and accountability, trainings, policy development, and technical support.

Since 2006, all of the KCTCS colleges have developed multiple career pathways programs and all students entering KCTCS technical programs are enrolled in career pathways. New initiatives, such as the online, modular KCTCS Learn on Demand and Accelerating Opportunity models are efforts to further refine this approach. For example, Kentucky has begun to explore how wrap-around student services, team-teaching curriculum and competency-based assessment might enhance the outcomes of students enrolled in career pathways. The system office has also made a concerted effort to ensure that the majority of the stackable certificates embedded in their pathways are credit bearing. The result of these efforts is evidence of the mission integration and systemic transformation sought by both KCTCS and the Ford Foundation.

Career Pathways are developed, implemented, and maintained through partnerships among secondary and post-secondary education, the state Office of Employment and Training and employer partners. Although there are many industries represented across the state, the most common KCTCS Career Pathway sectors include:

- Business
- Information Technology
- Manufacturing and Industrial Technology
- Healthcare/Nursing and Allied Health
- Natural Resources/Energy

The goal of Kentucky's Career Pathways, according to the KCTCS's website, is to link academic credits and credentials with a seamless system of career exploration and preparation, and skill upgrades, and to provide multiple entry and exit points spanning secondary, post-secondary, adult and workplace education.

The Virginia Career Pathways System

Another statewide example is the Commonwealth of Virginia, which in 2008 launched the process of building a statewide career pathways system designed to meet the needs of its regional labor markets and create career opportunities for its residents. This ambitious effort weaves together the state's education, workforce development, and economic development systems at all levels to drive efficiencies, leverage resources, and maximize impact.

Based on a Career Pathways Strategic plan, the Commonwealth has undertaken a number of initiatives to design and support development of career pathways:

- State leadership and an operational framework: The Virginia Career Pathways Workgroup was established to lead state efforts, with executive-level staff support and in partnership with the Virginia Community College System (VCCS). Working with local leaders and businesses, the Workgroup established regional leadership groups to begin developing pathways in advanced manufacturing, green technologies, allied health, corrections, and energy.
- Use data to strengthen connections to business, inform program development and measure success: State leaders expanded the use of the Virginia Longitudinal Database System, which tracks academic and employment history for students, to better support planning; the state also created a longitudinal data system to link and leverage data across the state's multiple education and workforce programs.
- Support transitions between education and employment systems at the regional and institutional levels: The workgroup led efforts to expand the VCCS student support website to include more extensive career information and to support transition from community college to four-year institutions. At the regional level, a number of apprenticeship programs have been established between school districts, the local community college, and regional employers in key industries.
- Expanded support services to increase workforce training retention and completion: Investments include the hiring of adult career coaches at each community college, transition specialists in key adult education programs, and the establishment of a statewide Career Coaches' Academy.
- Support development of employer and sector-based pathways: State funding has been leveraged to develop multiple pathway programs across the Commonwealth. Examples include a statewide Microsoft Academy for high school students; expansion of the PluggedInVA program that prepares adult learners for post-secondary success; and the Troops to Energy Jobs pilot that helps returning veterans transition into energy jobs.

The Virginia Careers Pathway System has attracted attention as a national model for building an effective education to workforce pipeline.

Community Colleges and the Mississippi Corridor Consortium

Innovative approaches can be developed at the college level as well. James Williams, vice president for economic development at Itawamba Community College in northeast Mississippi, and his colleagues at three other Mississippi community colleges have joined together to form the Mississippi Corridor Consortium and developed an approach that appears to meet the needs of both the business and education communities. The pathway was developed with input from local employers. As Williams says, "Engagement with our local manufacturers is one the most important things we do and one of our strongest assets."

"We came together in 2005 and developed a sector strategy for manufacturing," Williams explains. "We have three areas that we focus on: Advanced or Automated Manufacturing, Health Care, and Educational Attainment. But as a group, a lot of our focus is on manufacturing, because we have the highest concentration of advanced manufacturing jobs in the state of Mississippi."

The pathway developed by the Consortium starts with Adult Basic Education (ABE), with a focus on preparing students for work. This early part of the pathway also includes the National Career Readiness Certificate. The hope, Williams says, is that students without a high school diploma and who are unlikely to pass the GED Tests easily will obtain their National Career Readiness Certificate, because that will help them get a job; once they have secured a job, they can continue in ABE until they are able to pass the GED Tests.

The second level is, as Williams describes, "a regional certificate called Manufacturing Skills Basic Certification – an 86-hour program. All four colleges have designed and institutionalized this certification, and we have standardized tests that we give our students to earn this certification. And, our local manufacturers have bought into this credential to help them get quality people."

Students who continue on to the next level of the pathway advance into three technical skills areas: consulting maintenance, industrial maintenance, and advanced machining. Each one of those programs is currently being certified, and all of the programs and instructors at this level are in the process of being nationally credentialed via the NCCER, a not-for-profit education foundation created to develop standardized construction and maintenance curricula and assessments with portable, industry-recognized credentials.[58]

At the next level, students can get college credit for the non-credit courses by demonstrating prior knowledge. Challenge Exams developed by the Consortium allow students to accrue up to an entire semester of college credit from prior knowledge and/or non-credit training. The full pathway allows students to be employed while they work on their associate's degree.

Conclusion – Going Forward

There is a great deal happening that creates a moment of opportunity to move this agenda forward. There is a growing recognition of the problem and a beginning consensus on the solution set, but to move in the direction of a stackable, portable credential approach, all stakeholders in all areas of education, government and business with an interest in education, labor, and training need to get together and agree upon the most effective methods and the responsibilities each area will have in making such a system work.

[58] www.nccer.org/

The current silos of secondary and post-secondary education systems – and the funding streams that keep them separate – will not prepare enough students to meet the demand for middle- and high-skilled employees. There must be, as the authors of *Enterprising Pathways* write, "increased coordination among secondary and post-secondary institutions and the workforce to ensure smooth transitions for students between systems and to improve successful post-secondary completion and employment."

Collaboration between education and the business world should lead to better agreement on what's needed and what can be done. Educational institutions that prepare students for the workforce must become more responsive to the needs of employers, but businesses also need to understand the difficulties of establishing new training programs, particularly for technical positions for which there are limited openings. The business community will have to recognize colleges' commitment to multiple pathways to productive careers.

Education needs to acknowledge the importance of teaching – and certifying – soft skills like the "7 Cs" of working in the 21st century: creativity, collaboration, communication, critical thinking, computing, career self-reliance and cross-cultural understanding. Employers must agree that portable, stackable credentials will have real labor market value and that higher-level credentials will lead to advancement and raises. If employers do not use the credentials as a pre-requisite for job application, or the basis for career and salary advancement, their value plummets.

Reinforcing these sentiments, the Harvard *Pathways to Prosperity* authors wrote: "[W]e must embark on an effort to build a more comprehensive American system of pathways to prosperity -- one that is better equipped to meet the widely diverse needs, interests and abilities of all our young people... the pathways system we envision would require [students] to become deeply engaged in multiple ways at an earlier stage -- in helping to set standards and design programs of study; in advising young people; and most importantly, in providing greatly expanded opportunities for work-linked learning. In the process, employers would become full partners in the national effort to prepare young adults for success."[59]

Building on key innovations in the field – the career pathways system work developed by Kentucky and Virginia – NAM's rigorous process to design a certification system for advanced manufacturing, and the work on the Common Career Technical Core, we have the beginning building blocks of a technical career pathways system that will have at its core portable, stackable post-secondary credentials.

The U.S. Departments of Labor and Education have shown tremendous leadership over the past two years by beginning to envision a set of design elements for a rigorous career pathways system. Going forward, we have a huge opportunity to reshape and provide incentives for state higher education systems and employer associations to begin the process of design and alignment. We need a comprehensive review of federal education policies across all the key pieces of federal legislation, including ESEA, Carl Perkins,

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[59] "Enterprising Pathways," ob. cit., quoting from "Pathways to Prosperity"

and WIA, to develop a shared vision and policies that support industry-recognized portable, stackable credentials.

As *New York Times* columnist and author Thomas Friedman notes, "We're in the midst of a perfect storm: a Great Recession that has caused a sharp increase in unemployment and a Great Inflection — a merger of the information technology revolution and globalization that is simultaneously wiping out many decent-wage, middle-skilled jobs, which were the foundation of our middle class, and replacing them with decent-wage, high-skilled jobs."[60]

We need to ask and address key questions about what right incentives, policies, and financing vehicles will support a more fluid, portable system where it matters less where you obtain credentials, but more their value. What policies are needed to support learning at work as a strategy to gain the competencies that lead to credentials?

To reach a broad consensus, all stakeholders-business associations such as NAM and CompTIA+, certifying bodies such as NIMS, post-secondary education leaders, national associations representing key institutional interests including AACC and the State Directors of Career and Technical Education – must be deeply engaged in the development of the career pathways credentialing system.

Adapting our post-secondary education and credentialing system to meet the needs of the 21st century will be a complex process. As a nation, we need to recognize and embrace that there are essentially "two noble paths" to family sustaining income, and both involve post-secondary education: portable, stackable industry-recognized credentials and/or a traditional college degree. However, with the right stakeholders on board, we have the opportunity to make the kinds of changes that will benefit the economy and the population as a whole.

[60] http://www.nytimes.com/2012/11/18/opinion/sunday/Friedman-You-Got-the-Skills.html?pagewanted=1