



Stackable Credentials



Tool Kit



Prepared by

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Social Policy Research Associates



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Mapping Upward
*Stackable Credentials
That Lead to Careers*



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Introduction

Background

The approach by community and technical colleges of embedding “stackable” certificates aligned to industry certifications within associate degrees has emerged in recent years as a practical way of helping students progress along the education continuum while earning credentials with labor market value. By organizing programs into a series of certificates that build on each other, colleges can offer incremental milestones on the path to associate degree completion. Stackable certificates are intended to represent exit and entry points designed to maximize skill acquisition, employability, and seamless transition to careers. Ideally, learners can exit a program for full-time employment and resume where they left off when they’re ready to pursue the next level of credential or degree attainment, or leverage their newly earned credential to secure an entry-level position in their chosen career field while continuing their education part-time.

The Mapping Upward Project

Mapping Upward was a two-year project of the U.S. Department of Education’s Office of Career, Technical, and Adult Education (OCTAE) that concluded in September 2017. It provided technical assistance (TA) to 13 community colleges in their efforts to embed stackable credentials within technical associate degree programs. The *Mapping Upward* TA colleges consisted of the following:

- Bakersfield College, Bakersfield, California
- Catawba Valley Community College, Hickory, North Carolina
- Forsyth Technical Community College, Winston-Salem, North Carolina
- Isothermal Community College, Spindale, North Carolina
- Lehigh Carbon Community College, Schnecksville, Pennsylvania
- Luzerne County Community College, Nanticoke, Pennsylvania
- Mitchell Community College, Statesville, North Carolina
- Northampton Community College, Bethlehem, Pennsylvania
- Piedmont Community College, Roxboro, North Carolina
- Reedley College, Reedley, California
- Robeson Community College, Lumberton, North Carolina
- Rowan-Cabarrus Community College, Salisbury, North Carolina
- Shasta College, Redding, California

An earlier edition of this tool kit was field-tested with the *Mapping Upward* TA colleges and refined during the 2016–17 academic year.

Prior to the selection of the *Mapping Upward* TA colleges, the project team interviewed faculty and staff from nine community and technical colleges that had been offering stackable credentials for several years. The project team extends its thanks to the following study colleges, whose staff participated in the interviews:

Collin College, McKinney, Texas
Edmonds Community College, Lynnwood, Washington
Gateway Technical College, Kenosha, Wisconsin
Harper College, Palatine, Illinois
Hillsborough Community College, Plant City Florida
Moraine Valley Community College, Palos Hills, Illinois
Owensboro Community and Technical College, Owensboro, Kentucky
St. Louis Community College, St. Louis, Missouri
Westmoreland County Community College, Youngwood Pennsylvania

The study colleges helped inform the project’s TA services and provided myriad examples from which other colleges can learn and benefit. Case studies of six of the nine colleges appear in the appendix.

Both groups of colleges—the nine study colleges and the 13 *Mapping Upward* TA colleges—provided the “ideas from the field” that appear throughout this tool kit.

What’s All the Fuss About Stackable Credentials?

For the past several decades, community and technical colleges have been meeting local workforce needs through short-term certificates and diplomas. More recently, however, many colleges have redesigned their technical programs to align more closely with the skills needed in high-demand industries. These program redesign efforts, coupled with growing recognition of the value of aligning curriculum with industry certifications, have led to a noticeable uptick in the number of colleges seeking to offer “stackable credentials.” The U.S. Department of Labor defines a “stackable credential” as “part of a sequence of credentials that can be accumulated over time to build up an individual’s qualifications and help them move along a career pathway or up a career ladder to different and potentially higher-paying jobs” (Training and Employment Guidance Letter 15-10, [U.S. Department of Labor, Employment and Training Administration](#)).

Stackable credentials support *career pathways*, a combination of rigorous and high-quality education, training, and other services that are aligned with regional industry needs and support postsecondary credential attainment and career advancement. A significant investment of state and federal resources has provided support for career pathways as an important part of a broader education and workforce development agenda. Whereas a career pathway typically focuses on an entire career *field*, stackable credentials focus on sets of competencies within the pathway. An ideal setting for the development of a stackable

credentials program would be one in which a local career pathways system—sustained by strong partnerships with employers and community agencies—is already in place.

A stackable credentials approach to program design encourages colleges to

- engage often and at deeper, more complex levels with business and industry to identify current and future workforce needs;
- identify and embed up-to-date preparation for industry certifications within the curriculum;
- facilitate job skills validation by employers to ensure that curriculum, instruction, and work-based learning prepare students for careers;
- develop career maps, ladders, and other visual aids that identify entry and exit points and show the alignment of college and industry credentials and associated career opportunities; and
- offer course delivery options that are flexible and responsive to the needs of diverse learners.

Planning for Stackable Credentials

The potential benefits of stackable credentials are clear, but the collaboration involved in designing and implementing a stackable credentials program requires serious investment—human, fiscal, and political—from many stakeholders. You will need a team of partners that includes local and regional employers, industry associations, faculty members, and administrators, and may include other education institutions in your region as well as workforce and economic development agencies. To build this team, you should establish early on what you are attempting to do and why. What problem are you trying to solve? The answers will guide the development process, help you recruit partners, and, ultimately, drive the work. Some programs are developed to resolve institutional challenges, such as the need to increase program completions and improve job placement rates. Others are developed to meet industry demand. Your program can address both motivations.

As a first step, consider how you can build your case for creating stackable credentials.

Stackable credentials may be particularly useful if

- there is a local and/or regional shortage of entry- and mid-level talent.
- there is a lack of unanimity among employers about the competencies required for specific positions.
- your institution has embraced a career-pathways approach but your program's entry and exit points are still not clear, or are too few.

- employers are uncertain of the competencies students have upon completion of your program.
- your program struggles with low enrollment.
- your program has a low completion rate because students exit early for work.
- your program struggles to place graduates.

Evaluating Your Initiative

When you have identified the key goals for your stackable credentials initiative, develop strategies for tracking success, course correcting, and measuring impact. Plan for data collection so that you can document your processes and monitor results both in the short term and over time.

Consider what you expect to learn from your work on stackable credentials. If you are piloting a project with the intention of scaling it, documentation will be essential. At the end of the pilot you will want to know what steps you took and why, the tools that were useful, what worked well, and what did not.

If you are implementing stackable credentials in pursuit of an institutional goal, such as increasing the percentage of students who obtain credentials, tracking interim indicators is a likely priority.

If you already offer stackable credentials but are adopting a different approach, consider designing a comparison study to determine which approach was more effective and why.

Finally, consider designing your data collection strategy to capture the impact of your initiative on student outcomes over time, even beyond completion of the pilot. A rigorous evaluation can provide valuable insights. Conducting strong impact studies requires an understanding of numerous technical topics. The U.S. Department of Education's Institute of Education Sciences makes available a variety of [technical assistance resources](#) for evaluators who want basic resources on the design, implementation, analysis, and reporting of findings from impact studies.

Using the Tool Kit

This tool kit is organized into sections on topics of importance to colleges considering a stackable credentials approach. Each section provides information, hyperlinks to online tools, and suggestions on how to use them.

Consider reading the tool kit in sections and hosting roundtable discussions as you progress through the content. Use the reflection questions in each section to jumpstart your conversations and divide up research tasks using the suggested tools.



IDEAS FROM THE FIELD: Why Stackable Credentials?

To respond to employer needs quickly and thoroughly

Gateway Technical College (GTC) (Kenosha, WI) completely redesigned its automotive program in 2007 when the college became aware that local dealerships and auto shops were not hiring GTC graduates. The college engaged regional firms at every step, recognizing that the conversation could not proceed without the strong support of and input from the regional employers that would hire program graduates. Employers needed skilled technicians and they needed them fast. This posed a challenge to faculty: How to integrate everything employers need in the shortest course of training. Stackable credentials were a good design choice. The faculty and employers designed a program that frontloads foundational technical skills in the first year and addresses more advanced technical skills and general education requirements in the second year. Students can complete a technical diploma in one year and be ready for entry-level work, meeting immediate workforce needs. When students complete the diploma, they are also halfway to completion of the associate degree. While many students complete the second year right away, others exit the program to enter the workforce or work while completing the second year part-time. Because employers recognize the value of the second year of training (which they also helped to design), many support the program by helping to defray the cost of tuition or giving program enrollees flexibility in their work schedules.

Employer Engagement

Employer Partners—Onboarding for the Long-Run

Employers are critical partners in the design of stackable credentials programs. Their feedback regarding workplace expectations will serve as the cornerstone of the curriculum. They are also essential partners in providing work-based learning experiences. Throughout the process of designing, implementing, and sustaining your program, you will need employer participation and leadership. There are many ways to engage employers. At the end of this section are suggested resources that can help you get started. Although each community is unique, these cross-cutting strategies will set your efforts up for success:

- **Affirm the need for stackable credentials and clarify training goals.** You might think stackable credentials are a good strategy for your department or students, but what is the value for *employers*? What data do you have to support this assertion? How well do you understand what employers need? Before initiating program design, decide how you will engage employers and what the engagement process will yield.
- **Create a culture of employer leadership.** The design of stackable credentials should be driven by industry demand and led by employers. Pipelines to jobs are important outcomes. Establish the understanding, among employers and education partners alike, that *employers'* needs will drive this effort.
- **Build expectations for the future.** You will need engaged employers at all stages of design, development, and implementation. Set the expectation from the outset that this is a partnership, not a cursory curriculum review.

Where to Begin: Initiating the Journey With the Right Stakeholders

To ensure that curriculum is demand-driven, your program should engage local and regional employers. But which ones, and how will you engage them? For answers to these questions, begin by looking at the career pathways program(s) already in place at your institution or in your community. Gather [labor market information](#) to identify sectors with sizable employment opportunities. Then narrow your conversation to specific employers and convene industry leaders from across the sector you've chosen for development or redesign. You'll establish a good foundation for future relationships with these companies by demonstrating that your college is a willing partner, ready to listen to their hiring needs—both immediate and future—and eager to collaborate on new programs to meet those needs.

Here's a snapshot of a sector-based industry engagement process:

1. Identify local and regional employers within the sector.
2. Engage business leaders (CEOs, plant managers, senior executives) from the sector in a dialogue session to prioritize workforce needs that must be addressed.
3. Once priorities are identified, develop a sector-focused action plan in collaboration with dialogue session participants. Invite them (or their designee) to play a role in a new partnership that supports workforce development in the sector.

The Convening: Asking the Right Questions of the Right People

Step 2 in the preceding list requires focused time and effort to ensure the right people get to the table and that the right questions are asked. The questions should help you “drill down” to the level of specificity necessary to ensure that the curriculum equips students for the workplace. Invite the most senior leaders of businesses in the sector, people who are aware of not only their company's employment needs but of trends within the industry. Engage individuals who have the authority to commit company resources to the partnership. Respect participating employers' time investment and keep the meeting length to no more than a few hours. Let attendees know you have assembled representatives from the sector to listen to their concerns about workforce needs and form a partnership that will benefit employers across the sector. The operative word in this sentence is *listen*. Once employers know you are serious about wanting to meet their workforce development needs, they will share the detailed information you need to respond effectively. Ask questions about topics like these:

- Occupation-specific labor pool needs
- Gaps in technical and employability skills
- Current industry challenges and operational obstacles
- Projected changes to the industry that will impact curriculum
- Partnership opportunities, including work-based learning experiences
- Industry certifications most valued in and/or required of job applicants

Here are example questions that might be asked at a convening of employers in the manufacturing sector:

- *What are the top three challenges facing the region's manufacturing industry over the next five years? What are the implications for the industry's workforce?*
- *What are the top five occupational areas in which the manufacturing industry is facing the most severe employee shortages?*

- *At the entry level, what are the three greatest skill and/or employability weaknesses you see in your current skilled labor workforce?*
- *Do you anticipate the region having a large enough pool of skilled candidates from which to draw employees within the next 18 months? In the next five years?*
- *If your answers vary by skill area (e.g., Computer Numerical Control operators, machinists), specify accordingly.*

Your discussions with employers about hiring and training needs should include a conversation about the industry credentials they value. Their answers may be more diverse than you expected. As needed, help them understand the credentialing landscape and how it is changing. (*The Association for Career and Technical Education (ACTE) primer [“What Is a Credential?”](#) is useful for introducing colleagues to this topic. For more on this document, see the tools at the end of this section.*)

Everyone participating in the convening should be made aware that the most effective programs are built on credentials that are

- **Industry-recognized/valued**—Credentials that are either developed or endorsed by a nationally recognized industry association or organization and are sought or accepted by local companies within the sector for purposes of recruitment or hiring.
- **Stackable**—A credential that is part of a sequence of credentials that can be accumulated over time to build up an individual’s qualifications is considered stackable. Typically, stackable credentials help individuals move up a career ladder or along a career pathway to different and potentially higher-paying jobs.
- **Portable**—Credentials that are recognized and accepted as verifying the qualifications of an individual in other settings—either in other geographic areas, at other educational institutions, or by other industries or employing companies—are considered portable.

If you have difficulty convening employers, what can you do? Find a “champion” among local employers who can invite others from the sector. Ask your local chamber of commerce director to co-host the meeting with you. Leverage other employer organizations or industry groups such as a regional manufacturers’ association.

Is a group meeting really necessary? Yes. Granted, you could interview employers one-on-one, either in person or over the phone, or you could ask them to complete an online survey, but the level of engagement you will experience and the resulting networking of employers across the sector makes a convening worth the effort it takes to assemble the group.

The ultimate measure of your employment engagement efforts is the extent to which your partnership is able to produce

- programs that match the economic development needs of your community, and
- graduates who possess the skills necessary to ensure that employers have access to a high-quality workforce.

Once employers have identified what they need, move quickly to capitalize on this momentum and build a sector-based partnership whose partners are willing to

- adopt a common language,
- commit to strategies benefitting the sector and community as a whole, and
- see the journey through.

Building a Sustainable Employer Partner Team

The next step following the initial convening is to form the employer partner team. Some of the people who attended the convening may not be the best representatives of their companies to actively participate in the partnership long term, but they can help you find the right people. Seek individuals who are well informed about the skills your students should acquire and who are well positioned in their companies to partner on work-based learning experiences.

Regardless of the label you give your team—*employer partner team*, *employer advisory committee*, *business-industry leadership team* (BILT)—the team must be employer-led—no exceptions. Once you have earned the trust of your employers as talent development partners, continue to cultivate that relationship through actions that demonstrate that your college is committed to meeting industry’s skill needs and capable of responding quickly.

While strong employer partnerships can yield significant benefits for your program and college, don’t assume your journey will be free of speed bumps. As with any partnership endeavor, expect challenges along the way. Doing your homework and anticipating issues you may face when bringing together different cultures—business and education—will prepare you for the road ahead.

Potential challenges you may encounter include the following:

- Moving from discussion to commitment
- Getting employers and educators to articulate their expectations and agree on how they will measure success
- Finding common ground and developing mutual respect
- Understanding each other’s needs and “decoding” unfamiliar terminology (particularly education jargon)
- Engaging the right combination of employers who can identify skills and workplace competencies needed by entry-level employees

- Keeping all partners engaged to maintain momentum
- Finding people who can make things happen

Be flexible, be open to new possibilities, and be willing to *partner*. The destination will be worth the investment in the journey.

Key Considerations/Ongoing Assessment

Reflect on and discuss with colleagues the following questions on employer engagement:

- Have inventories of the economic development and labor needs of the community been conducted? By whom? How recently?
- Have local employers shared the academic, technical, and workforce credentials they value and prioritize when hiring and deciding whether to retain employees?
- Are program-specific industry advisory committees led by employers? Is the work of the committees coordinated in a manner that ensures efficient use of employers' time?
- Do the committees (or other term used to describe a partnership between the college and employers) include a strong degree of permanence as evidenced by signed agreements, a shared vision, formal decision-making, and periodic goal-setting?
- Is the return on investment for employer partners documented in a manner useful to them?
- Do employer partners offer work-based learning experiences for both students and faculty? What about donations for student scholarships or in-kind support for competitions, equipment, and other resources?



IDEAS FROM THE FIELD: Engaging Employers

Engaging employers as a group and individually

The automotive faculty at Owensboro Community and Technical College (OCTC) (Owensboro, KY) developed two procedures for working with employer partners. First, the program convenes a formal advisory board that meets several times a year and provides guidance to and advocacy for the program. Second, automotive faculty regularly visit their employer partners. These check-ins support student interns at their workplaces, help faculty gather information that can improve the program, and provide an opportunity to promote the program to company employees. It was through these informal check-ins that faculty first learned that alternative fuel vehicles were becoming part of regional fleets, increasing the demand for technicians skilled in working on those vehicles. This led to the development of OCTC's

alternative fuels program—developed in close collaboration with the employer community to ensure training and certification meet the evolving needs of regional employers.

Using alumni to build the network

Moraine Valley Community College's (Palos Hills, IL) information technology faculty work closely with their employer advisory board. What makes the board unique is that it includes program graduates who have advanced to executive and managerial positions with regional companies. This is by design: Faculty members instill in students the expectation that they can return to serve on the advisory board once they have advanced in their jobs. Program alumnae have a good understanding of the knowledge and skills of students coming out of Moraine's information technology program and understand how the program is structured, making them well equipped to suggest changes.

Engaging employers at the state level

The Florida Advanced Technological Education Center (FLATE), a National Science Foundation Center of Excellence in high-tech manufacturing, developed state-approved curriculum frameworks for engineering technology associate degree and certificate programs. FLATE works with statewide manufacturers and national manufacturing associations in developing curriculum and providing professional development for instructors. Hillsborough Community College (Plant City, FL), which houses FLATE, benefits from industry involvement in curriculum development at the state level. The college also maintains its own relationships with over 2000 smaller regional manufacturing firms in Central West Florida to facilitate internship opportunities, provide upskilling training, and respond to regional workforce needs.

Reinventing advisory committees through a business industry leadership team (BILT) model

Over the last several years, advanced manufacturing programs at Forsyth Technical Community College (Winston-Salem, NC), have been directed by a faculty-led industry advisory committee. However, faculty felt that to achieve the level of employer engagement necessary to develop and maintain industry-responsive programs, the committee should be led by industry. With the assistance of a new committee chair, a high-level manager at a large manufacturing firm, the college has transformed its advisory committee into an employer-led business and industry leadership team (BILT). The goal of the team is to engage local industry professionals to drive curriculum improvement, recruitment, and community engagement. Selecting a chair from industry was critical to ensuring the team's initial success and effectiveness. BILT members also felt the need for new structures and collaborated to

- create a mission and vision statement,
- draft a strategic plan,
- draft a communication plan, and
- choose an annual focus area.

The BILT's initial area of focus is student recruitment into advanced manufacturing programs. Other areas in which the BILT will be active include providing guest lecturers, mentors, and facility tours, and driving curriculum improvement initiatives.

Leveraging the chamber as a convener

The Roxboro, North Carolina, Area Chamber of Commerce has developed long-term relationships with business, industry, and education partners. These relationships led to the creation of the chamber's industrial relations committee (IRC). At the IRC's monthly luncheon, current workforce trends and issues are discussed and professional relationships are strengthened. Staff from Piedmont Community College's (PCC) (Roxboro, NC) customized training program benefit from the monthly IRC convening as well as one-on-one meetings with local industry partners because of the supportive business relationships they have been able to nurture. Industry partners have provided funding, sponsored plant tours, hired students, participated in curriculum planning, and provided logos to be used on PCC's training advertisements.

Using special events to engage new partners

Isothermal Community College (Spindale, NC) encourages peer colleges never to underestimate the importance of a well-planned event to advance community relationships. Isothermal's technical curriculum department partnered with its customized training and human resource development programs to introduce the college's plans for a new comprehensive applied sciences and workforce development center. Positioned as an industry appreciation luncheon, the event was designed to bring together representatives from the college, regional industry, and local economic development organizations to learn about plans for the center and the training opportunities it presented. In preparation for the luncheon, an invitation with a rendering of the new building was printed in the college's print shop. Hand-addressed invitations were mailed four weeks before the event. Two weeks before the event, invitees who had not replied were contacted by telephone to make sure they had received the invitation and were asked to confirm their plans to attend. One week before the event an email reminder was sent to all invitees. Eighty-three of 90 invited guests attended, representing industry, economic development, and college partners. Area employers gained a new understanding of the college's commitment to creating a pipeline of qualified workers with advanced manufacturing skills. As a direct result of the event, new employer partners have met with college staff to learn more about training, technical education, and partnering on work-based learning opportunities.



TOOLS

Business and Industry Leadership Teams (BILTs)

Target Audience: Community college educators and administrators seeking to align programs with the skill needs of business and industry

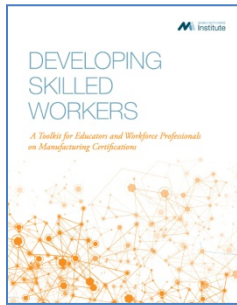
Description: BILTs have been formed in several industries using a model initiated by the Convergence Technology Center, an NSF-ATE Center of Excellence at Collin College in McKinney, Texas. In this model, the BILT defines the knowledge, skills, and abilities that business representatives want to see in future community college graduates and assists partner colleges through recruitment and hiring, class presentations and keynotes at conferences, traditional internships, and virtual internship/externship experiences using business mentors. BILTs bring together high-level executives and technicians, from large corporations and small companies alike, who understand the state of the industry and what skills are in demand. The BILT model was featured in a webinar titled *Effective Approaches for Aligning Curriculum with Business Demand*. The webinar features systematic approaches colleges across the country are taking to ensure workforce programs are closely aligned to industry. The [slides and archived webinar are available for download](#), as is an [issue brief on the BILT model](#). You can also watch [videos](#) of educators and employers engaged in the BILT process.

How and When to Use It: When seeking to initiate stackable credentials programs or improve alignment of current programs to prevailing business conditions

Types of Outcomes: Improved alignment between educational program outcomes and local industry needs

Developing Skilled Workers: A Tool Kit for Educators and Workforce Professionals on Manufacturing Certifications

Target Audience: Entities that work directly with manufacturers to help them implement workforce certification (community colleges, instructional deans and administrators, division directors, manufacturing/technology faculty members, public workforce systems, and manufacturing extension partnership consultants)



Description: [Developing Skilled Workers: A Tool Kit for Educators and Workforce Professionals on Manufacturing Certifications](#), published by the [Manufacturing Institute](#), provides a roadmap for manufacturing companies that seek workforce certification. The tool kit outlines the pathway to certification in six steps: Step 1: Decision: Is Certification Right for Us?; Step 2: Analyze Company Skill Needs; Step 3: Match Job Certification and Skill Levels; Step 4: Develop Pilot Plan; Step 5: Institutionalize (Deploy) Certification; and Step 6: Improve and Sustain. For each step, the tool kit provides background information, tips for preparation and facilitation, and information on how to measure success.

How and When to Use It: As a guidebook when seeking to implement manufacturing workforce certifications

Types of Outcomes: Opportunities for workforce certification in targeted localities, along with resulting improvements in workforce performance

Employer Engagement Tool Kit: From Placement to Partners

Target Audience: Training providers, workforce development organizations, community colleges, other educational institutions, and community-based organizations that seek to integrate employer engagement into the core decision-making of their programs



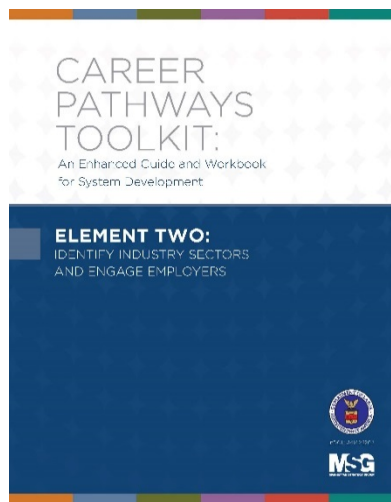
Description: The [Employer Engagement Tool Kit](#) was created by Kevin Doyle of the Green Economy for the GreenWays Initiative and published by [Jobs for the Future](#). Each of the four component tools can be used as stand-alone items, but they progress sequentially and can also be used as a group. The tool kit begins with a tool for assessing current employer relationships. It also provides ideas for new employer outreach and strategies for positioning organizations as industry conveners. The four tools are Tool 1. Getting Ready. Where Are You Now?; Tool 2. Targeting Your Relationships; Tool 3. Becoming a Go-To Convener; and Tool 4. Partnering on Program Design and Delivery.

How and When to Use It: When seeking more effective relationships between workforce development stakeholders

Types of Outcomes: Increased employer participation in program design and development; stronger relationships among education institutions, workforce development organizations, and employers

The Career Pathways Toolkit: An Enhanced Guide and Workbook for System Development, Element 2: Identify Industry Sector and Engage Employers

Target Audience: Education and workforce partners looking to identify industries that would benefit from stackable credentials and seeking strategies for effective employer engagement



Description: This resource is the [second element of the Career Pathways Toolkit: An Enhanced Guide and Workbook for System Development](#), which was released by the U.S. Department of Labor (USDOL) in 2016. In the spirit of the original (2011) *Career Pathways Toolkit*, the revised version is designed to guide state and local leaders in building, implementing, and sustaining career pathways systems and programs. The revised tool kit acknowledges many of the strategic investments made by the USDOL for the purpose of creating and sustaining a demand-driven employment and training system as part of a larger national effort. It incorporates the Career One-Stop competency model as a building block for creating career pathways programs and references the Career One-Stop Credentials

Toolkit as an easy way to search existing industry-recognized credentials. It also includes writeable worksheets to assist teams in career pathways planning and implementation.

How and When to Use It: When looking for industries and occupations to target for stackable credentials; when looking to engage employer partners

Types of Outcomes: LMI that can help guide employer engagement; enhanced regional partnerships with employers

Colorado Sector Partnership Convener Workbook

Target Audience: Education and workforce partners looking to build industry-led sector partnerships



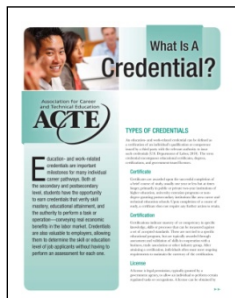
Description: The [Colorado Sector Partnership Convener Workbook](#) provides directions for engaging employers using the sector partnership model. Sector partnerships are regional partnerships led by industry and supported by education, workforce development, economic development, and community organizations that focus on issues related to the target industry. A key aspect of the sector partnership model is that it is employer-driven. The activities laid out in this guide take groups of employers through a guided inquiry that enables them to prioritize, as a group, the most important actions that will grow their businesses. This is a broad tool meant to address the needs of regional industry, which is why the public-sector team members include education, workforce, local government, and economic development.

How and When to Use It: This guide is particularly appropriate for cross-agency teams looking to support regional industries.

Types of Outcomes: Employer-led action plans, industry leadership and investment, shared outcomes, and better communication and teamwork across public sector partners

ACTE Brief: What Is a Credential?

Target Audience: Educators and employers interested in exploring what credentials are, how they are obtained, and what they signify



Description: ACTE's "[What Is a Credential?](#)" brief provides an overview of what credentials are in general and the four different types of credentials: certificate, certification, license, and degree. For each type of credential, the brief identifies the kinds of entities the credential is awarded by (education institution, business or trade association, government agency), what the credential results from (course of study, assessment, satisfaction of specified requirements), the length of time required to complete the credential, and (where applicable) how the credential is kept up to date.

How and When to Use It: In projects and initiatives requiring information on the nature and value of credentials

Types of Outcomes: Fundamental understanding of credentials

Designing Curriculum for Stackable Credentials

Having established a common interest in and demand for stackable credentials, partners can move forward with the task of designing curriculum. Because the stackable credentials approach is meant to prepare students for employment, employers must be engaged upfront so that their hiring needs can determine the skills and credentials on which your program will focus. Begin by asking employers to describe their expectations of exit points—what students should know and be able to do upon completion of each credential—and what industry certifications, if any, are aligned to each credential and valued by their companies.

Engage Employers in Curriculum Design

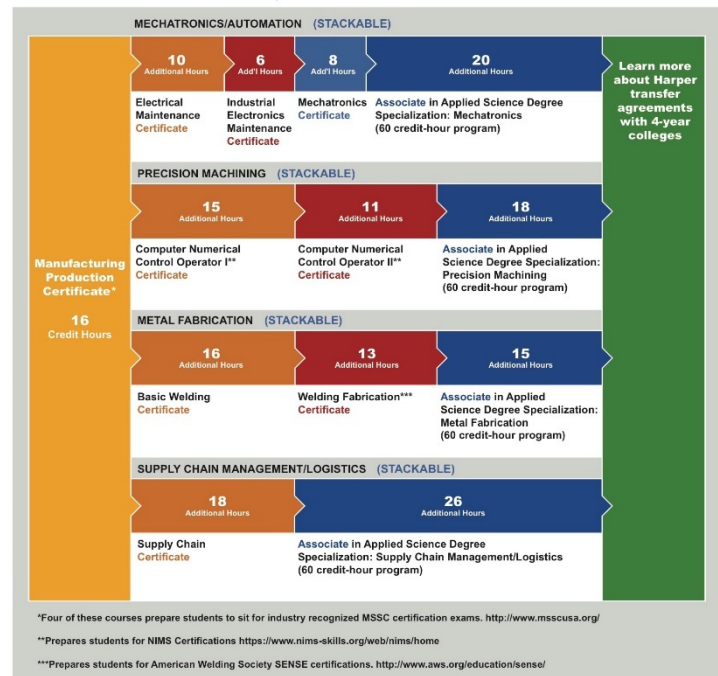
To help clarify what courses, certificates, and credentials your program should include, ask employers the following questions:

- What knowledge, skills, and abilities are in demand? What do employees need to know? What skills or competencies should new hires have when they arrive on the job?
- What skill *levels* are in demand? How many credentials are required to reach employers' desired levels of competency? Are employers looking primarily for entry-level certificate-holding applicants, or are they looking for ways to upgrade the skills of their incumbent workforce?
- What industry credentials have value across the sector, not just with particular employers?

The graphic on the right depicts the stackable nature of the industry credentials embedded in [Harper College's \(Palatine, IL\) manufacturing technology program](#). Built on the Manufacturing Skills Standards Council's (MSSC) Certified Production Technician (CPT) credential as a foundation, the program branches into four specialty areas, each consisting of a series of credentials that stack toward the associate degree.

Manufacturing Technology

CAREER PATHS - LEARN MORE, EARN MORE



Curriculum Design Considerations

When developing a stackable credentials program, you may not have to start from scratch. Your goal is to offer curricula that address the skills deficit identified by your employer partners. Look first at the existing program curriculum and determine what can be modified, adapted, or reorganized to address identified gaps. If entirely new content must be developed, consider the process described in the following sections. It is well-suited for programs composed of stackable credentials because it assumes a goal of producing sequential, nonduplicative content.

Creating a Stackable Curriculum

Just as a career ladder denotes a series of job-performance levels, each corresponding to certain knowledge and skills within a given occupational area, a stackable curriculum consists of a series of education milestones that students are expected to attain as they move through their programs. The stackable curriculum model is flexible enough to meet the needs of a wide range of students, presenting attainable intermediate goals and multiple exit points in the form of industry-recognized credentials at each level. There is no standard template for creating a stackable curriculum. Because of its flexibility, the model can be customized for different settings. In some cases, it may take the form of a ladder—in which students progress in a linear fashion—but it also may resemble a lattice or web, allowing for lateral movement as students earn credentials in multiple specialty areas. This flexibility also supports work-based learning experiences, such as internships and apprenticeships (including registered apprenticeship programs) allowing for tailoring of the curriculum to meet the specific needs of employers.

The number of “layers” in a stackable curriculum will depend on the certificate, diploma, or degree to be awarded, but the curriculum is organized by progressive levels (similar to the U.S. Department of Labor’s Building Blocks Competency Model):

- *Foundational level*—contextualized academic content, career experiences, and employability skills
- *Technical core level*—technical skills within a cluster and work-based learning opportunities
- *Technical specialty level*—advanced technical skills, advanced academics, and worksite experiences

Steps in the Curriculum Development Process

This process assumes you are developing a curriculum from scratch, but most of the steps presented would also be used in the revision of an existing curriculum. A committee comprising department faculty and employers who understand the jobs for which the pathway is designed to prepare students should collaboratively design program content.

1. For each job title or cluster of job titles supported by the pathway, develop the list of job tasks that will map to each potential course and sequence of courses to be written.
2. Identify appropriate and locally relevant industry skill standards pertaining to the job tasks so that those standards can be embedded in the coursework.
3. Consider institutional guidelines for lecture and laboratory contact hours; group required goals, objectives, and instructional content into a logical sequence of courses.
4. Create a chart or matrix identifying where in each course specific job tasks and industry skills standards are being taught.
5. Develop and incorporate assessment measures and strategies, including a provision for industry certification examinations that document student learning and skill attainment.
6. Develop policies and procedures for noncredit/credit articulation to ensure that credit for skill attainment can be awarded regardless of the college division in which a given course originated.
7. Plan course delivery options that offer flexibility for working students.
8. Group courses into logical sequences of college certificates. Each certificate should stack toward the associate degree and lead to employment opportunities.
9. Consider instructor training, certification requirements, and laboratory and facility needs.
10. Develop a cycle for course and program review.

Career Maps as a Planning Tool

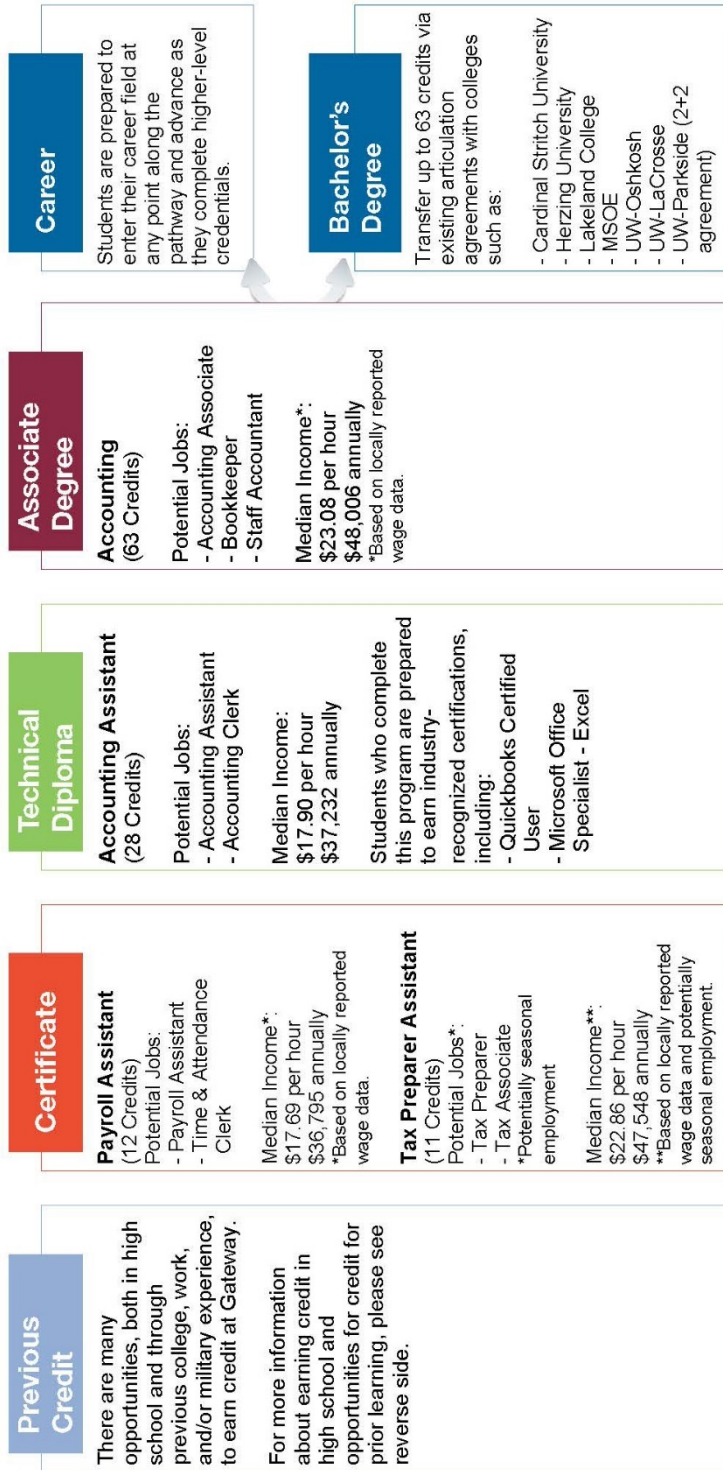
Having carried out the preceding steps, create a “map” of the career pathway being developed. The map is a visual depiction of the pathway’s overall structure showing the stackable credentials embedded in the pathway and the associate degree(s) to which they lead. The map provides an effective way to communicate academic milestones and inform students of opportunities to earn industry certifications and obtain jobs associated with each credential earned. The map can support advising by opening students’ eyes to trajectories to education and career goals they might not otherwise have considered.

TOOL TIP: *On the next two pages is a map depicting Gateway Technical College’s accounting career pathway. Following the map is a template for creating your own career pathway map. The PDF containing the template is a customizable form designed to accommodate a broad range of programs. The template can help your curriculum development committee keep its eye on desired outcomes and, once completed, serve as an advising and marketing tool.*

CAREER PATHWAY

Accounting

GATEWAY TECHNICAL COLLEGE



Salary and employment data for the Gateway district courtesy of EMSI.

gtc.edu/accounting



[Download a PDF of this career pathway map.](#)

CAREER PATHWAY

GATEWAY TECHNICAL COLLEGE

Accounting

Have questions or need assistance with getting started?

Gateway's New Student Specialists are ready to help. Call 1-800-247-7122 or stop into any Student Services Center to make an appointment or register for an upcoming new student event.

Elkhorn Campus
400 County Road H
Elkhorn, WI 53121

Kenosha Campus
3520 30th Ave.
Kenosha, WI 53144

Racine Campus
1001 S. Main St.
Racine, WI 53403

Credit for Prior Learning

Experience Pays! You've been there . . . You've done that . . . Let us give you credit for it!

Gateway Technical College recognizes you have knowledge and skills gained through previous educational, life and work experiences. We want to help you receive credit for those experiences — saving you time, money and helping you enter your new career more quickly.

There are various ways to earn credit including Degree Course Substitution, Prior Learning Assessment and Transfer Credit. Credit for Prior Learning opportunities for this program include:

- 101-104 Income Tax Accounting
- 101-106 Accounting Spreadsheet Apps
- 101-114 Accounting Principles
- 101-143 Payroll Accounting
- 101-154 Accounting Software Apps

For more information visit gtc.edu/cfpl or contact the Registrar's Office at cfpl@gtc.edu or 262-619-6366.

Earn College Credit in High School

Get an edge by earning college credit before you graduate and save money at the same time.

There are many ways to earn college credit while you're still in high school, including transcribed and advanced standing credit, Youth Options and youth apprenticeship. Suggested courses to take in high school for this program include:

- 101-114 Accounting Principles
- 101-143 Payroll Accounting
- 101-104 Income Tax Accounting

For more information on earning college credit in high school connect with your high school counselor or the Gateway New Student Specialist at your high school. Visit gtc.edu/highschool.

**Get started at
Gateway today!**
Visit gtc.edu/future-redhawks
to request information
or to apply.

gtc.edu/accounting

This ACT program is 100% funded with a TRACCCOCT Round IV \$19.9 million grant awarded by the U.S. Department of Labor's Employment and Training Administration. The program is an equal opportunity program and auxiliary aids and services are available upon request to individuals with disabilities. This workforce product was funded by a grant awarded by the U.S. Department of Labor's Employment and Training Administration.

The product was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The U.S. Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership. Except where otherwise noted, this work is licensed under the Creative Commons Attribution 4.0 International License.

Equal Opportunity Employer and Educator • Empleador y educador que ofrece igualdad de oportunidades • 2016-akt



Career Pathway

Pathway (Example: Nursing)

College name

College website



Previous Credit	Certificate	Additional Certificate and/or Diploma	Associate Degree	Career	Bachelor's Degree
<p>Use this space to provide information about the opportunities your institution provides for students to earn college credits while in high school, or to earn credit for prior learning such as previous college, work, and/or military experiences.</p>	<p>Use this space to identify certificates available within this program that stack toward a degree. Be concise, but list as much detail as possible about the certificate earned, program duration, potential employment opportunities, and industry certifications students are prepared to earn, as applicable.</p> <p><i>For each, list:</i></p> <ul style="list-style-type: none"> • Name of certificate • # of college credits • Potential job and median income • Industry certification 	<p>Use this space to identify additional certificates and/or a diploma that stacks toward a degree. Be concise, but list as much detail as possible about the certificate earned, program duration, potential employment opportunities, and industry certifications students are prepared to earn, as applicable.</p> <p><i>For each, list:</i></p> <ul style="list-style-type: none"> • Name of certificate/diploma • # of college credits • Potential job and median income • Industry certification 	<p>Use this space to describe the remaining credits in the pathway sequence needed to earn an AS or AAS degree. Include program details, potential employment opportunities, and additional industry certifications, as applicable.</p> <p><i>For the degree, list:</i></p> <ul style="list-style-type: none"> • # of college credits • Potential job and median income • Industry certification 	<p>Any additional details about career opportunities aligned to stackable credentials along the pathway</p>	<p>Information about any articulated baccalaureate degree options available to program graduates. List universities with current agreements and # of credits that can be transferred.</p>

[Download a customizable PDF of this template.](#)

This map has been adapted with permission from Gateway Technical College under a Creative Commons Attribution 4.0 International License.

Career Pathway

Pathway (Example: Nursing)

Have Questions or Need Assistance?

Provide contact information and office locations for advisors or counselors who can assist potential students.

Credit for Prior Learning

How can students obtain credit for prior learning, and who should they contact for more information?

Earn College Credit in High School

How can students obtain college credit while still in high school, and who should they contact for more information?

College name

College website

This map has been adapted with permission from Gateway Technical College under a Creative Commons Attribution 4.0 International License.

Questions to Consider as You Create Your Map

- What is the general scope of the pathway, i.e., at what skill levels does it begin and end? What workforce development issues are you addressing and/or opportunities are you providing through the creation of stackable credentials within the pathway?
- Who is your target audience?
- What occupations align to each exit point within the pathway?

Possible Elements to Include

- Description of the overall career pathway and the occupations within it
- Each academic credential within the pathway (certificate, technical diploma, associate degree, etc.)
- Corresponding industry certifications aligned to academic credentials
- Academic program duration
- Employment opportunities associated with academic credentials and industry certifications (Include job titles, salary ranges, and synopses of required skills.)
- If creating a web-based map or a document that will be viewed onscreen, provide hyperlinks to college and industry resources.

Themes in Stackable Curriculum Design

While stackable credentials have considerable variation across industries, we have observed themes that are often characteristic of longstanding programs. Stackable programs tend to have **technical skills frontloaded** in the first year or semester, they incorporate **industry-recognized credentials**, they offer **work-based learning** opportunities to practice skills and connect students with employers, and they **articulate** both “down” into the high school as well as “up” into baccalaureate transfer and sometimes “across” to other programs in the region. They also do the following:

- **Prepare students for entry-level employment.**
One of the key features of the stackable credentials model is that it creates milestones along the pathway to the associate degree. These milestones can be reached in less than two years (the typical duration of an associate degree) and are often industry-recognized, making the student attractive to employers despite the lack of a degree.
- **Embed industry-recognized credentials.**
Without exception, the colleges we interviewed have embedded industry-recognized credentials into their credit-bearing programs. The number and types of credentials included in each program will vary by occupational field and the degree to which regional employers value specific industry certifications.

- **Incorporate work-based learning into education pathways.**

Many of the interviewed colleges talked about the benefits of building work experience and work-based training into workforce development programs. Several colleges have developed ways to award credit for work-based learning. Some have built formal internships into their instructional frameworks. Two have developed apprenticeship or journeyman programs that are integrated with the awarding of stackable credentials.

- **Support baccalaureate transfer.**

Students who complete associate degrees that include stackable credentials are sometimes interested in pursuing baccalaureate degrees at other institutions. Although community colleges control how credits are transferred between their own programs, they have less control over whether and how credits they have awarded will be accepted for transfer by other institutions. Where transfer agreements have been put in place, the process can be seamless. In Florida, for example, for students who complete the engineering technology associate degree at Hillsborough Community College, the transfer of credits into the baccalaureate engineering program at four state colleges is automatic. At some colleges, formal articulation agreements have been executed with one or more institutions offering baccalaureate degrees in the same fields, but the transfer process is not automatic.

- **Partner with feeder school districts.**

Most of the colleges we interviewed have developed partnerships with the career and technical education (CTE) departments of feeder school districts. At a minimum, the colleges invite high school students to visit their campuses and provide professional development opportunities for high school teachers. Some partnerships offer dual-credit CTE courses for high school students. Colleges with strong connections to high schools are well positioned to increase enrollment among recent high school graduates, particularly those involved in dual-credit courses.



IDEAS FROM THE FIELD: Leadership and Innovation

Providing college-wide leadership

Leaders at Harper College supported the transformation of all workforce development programs to the stackable credentials model. In 2010 college and regional stakeholders developed a strategic plan that included a goal of increasing the number of students completing credentials and moving into employment. The stackable credentials framework helped departments rethink curriculum and how each credential within an associate degree program contributes to mastery of skills in a given field. This review process brought faculty and employers together to consider the progression of courses, the kinds of credentials that would signal the acquisition of skills, and whether industry-recognized credentials should be

embedded in the training. The college supported this effort publicly and provided funding for the faculty time and professional development required to transform the programs.

Initiating the use of stackable credentials within a single college program

Owensboro Community and Technical College used stackable credentials to introduce an alternative fuels curriculum into its automotive technician program in response to employer needs. Faculty members maintain close relationships with local employers and frequently revisit program offerings in response to formal program reviews and informal check-ins with employers of recent graduates. The certifications offered through the automotive technology program attract industry professionals interested in updating their skills as well as students seeking to enroll in the associate degree program and build careers as automotive technicians. A grant from the National Science Foundation has provided resources to widen the program's reach and impact on participants and employers.

Statewide collaboration proves key to success for small programs

The leading colleges in the California Horticulture Network, which consists of Bakersfield College (Bakersfield, CA), Shasta College (Redding, CA), and Reedley College (Reedley, CA), know that their programs benefit from engaging the field. Horticulture is changing—because of environmental constraints, new technologies, customer preferences, even labor market trends. It's not easy for programs—many of which are small—to keep up on their own. That's why network leaders are partnering with peer colleges and programs, industry associations, and the statewide faculty association in the development of a 16-unit horticulture program, built on a common core of nine units, that embeds industry-recognized credentials leading to certification (arborist or landscape maintenance). Once approved as a statewide model curriculum, it could be offered at any of California's 113 community colleges. The network is also exploring ways to leverage individual college expertise and California's new Community College Course Exchange (an online initiative) to enable smaller colleges to offer a greater range of specializations as well as labs they could otherwise not support. Collaboration on a single stackable credentials program has opened the door to a much greater range of possibilities for expanding, enhancing, and improving horticulture-related programs that lead to good jobs and careers—across the state.



IDEAS FROM THE FIELD: Stackable Design Elements

Frontloaded coursework that leads to entry-level careers and beyond

Gateway Technical College has established a one-year diploma in automotive maintenance as the half-way point in its two-year automotive technology associate degree. This 32-credit-hour diploma establishes that an individual has the basic skills to work as an automotive technician. Embedded within the one-year diploma are four industry-recognized certifications from the National Institute for Automobile Service Excellence (ASE): brakes, suspension and steering,

heating and air conditioning, and electrical systems. Holders of the automotive maintenance technician diploma are usually able to obtain positions in the field at a median wage of \$14 per hour. Many students go on to complete the second year of the automotive technology associate degree (and additional industry certifications) and secure jobs as auto line technicians at approximately \$20 per hour.

Industry-recognized credentials at regional institutions have global value

The mechatronics program at Westmoreland County Community College (WCCC) (Youngwood, PA) is organized around a single global industry standard—the Siemens Mechatronic Systems Industry Certification Program. The Siemens level-1 and level-2 certifications have been integrated into the WCCC curriculum for the mechatronics systems technician I and II academic certificates. According to Siemens, the level-1 certification, referred to by Siemens as a mechatronics systems assistant, means that the individual is “an intelligent machine operator.” The program places emphasis on “efficiently operating complex mechatronics systems and troubleshooting and foreseeing problems.” The level-2 certification, referred to as a mechatronics systems associate, means that the individual can function as a “highly skilled technician who can work with modules and components in complex mechatronics systems [and can] assess and analyze systems as a whole.” WCCC is an authorized Siemens testing center, although students can take the test at any of a number of testing centers around the country. Students are not required to pass the Siemens certification tests to earn the academic certificates from WCCC.

Building Advocacy and Tackling Tough Issues

Securing buy-in from your college’s faculty and administrators (and, as needed, other education institutions) is essential in developing coursework and awarding credit for your stackable credentials offerings. Consider the size and “climate” of your institution (politics and other intangibles) in deciding whether to begin building advocacy through group gatherings—information sessions, staff meetings, faculty senate meetings—or through one-on-one meetings with individuals whose support can help bring others on board. If you find yourself at an impasse or you have been tasked with facilitating a session in which “sticky” issues are to be addressed, consider using the exercise linked below. A Fishbone exercise enables participants to identify problems and brainstorm resources, services, and strategies to resolve them.

Download the [Fishbone exercise instructions](#).

Download the [handout to use with the Fishbone exercise](#).



IDEAS FROM THE FIELD: Building Advocacy

Accelerating the adoption process

Catawba Valley Community College (Hickory, NC) team members quickly realized the value of having a senior administrator closely tied to the decision-making aspect of adopting stackable credentials. They advise peer colleges to engage an upper-level administrator early in the process. Having someone from the institutional leadership team fully invested in the initiative accelerates information sharing and helps to prioritize resource allocation. Senior administrators have the authority to green-light new academic processes, often a critical aspect of incorporating stackable credentials. Include a senior-level advocate on your advance team when you begin exploring stackable credentials and your adoption process will likely progress more quickly.

Key Considerations/Ongoing Assessment

As you develop a curriculum embedded with stackable credentials, reflect on these issues:

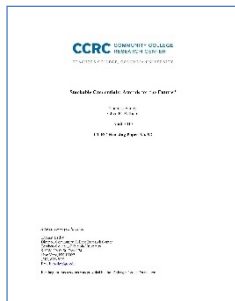
- Can existing programs be modified to meet local and regional workforce needs, or must new programs be designed?
- Is the curriculum directly tied to employment opportunities for high-wage and/or high-demand careers?
- Has the curriculum been built on academic and technical skills, as well as industry standards?
- Does the curriculum provide multiple entry and exit points?
- Have certificates been validated by employers and (as needed) revised to align with current local conditions?
- Has the curriculum been aligned to industry-recognized certifications?
- Has a career pathway map been developed depicting academic credentials aligned to career opportunities?
- Are articulation agreements in place to award credits earned through early college and dual-credit courses as well as those leading to baccalaureate degrees?
- If needed, how can you collaborate with employer partners to expand available work-based learning experiences?
- Is an articulation policy or procedure in place between noncredit and credit coursework that provides students the opportunity and guidance to avoid duplicative coursework and accelerate their accumulation of credentials?
- Are opportunities provided for credit for prior learning?



TOOLS

Stackable Credentials: Awards for the Future? CCRC Working Paper No. 92

Thomas Bailey, Clive R. Belfield; Community College Research Center, April 2017



Description: The authors of [Stackable Credentials: Awards for the Future?](#) assert that the stacking of credentials—combining short-term awards either with other short-term awards or with degrees—has the potential to help align skill supply with skill demand, especially for low-income and first-generation college students. They identify three types of stacks—progression, supplemental, and independent—and note that those types are likely to have different labor market impacts and meet different student needs. The authors acknowledge that short-term awards, including

vocational credentials and more formal, credit-bearing certificates, are becoming more prevalent. But how this growth matches with the growth of stacking is unclear. Aided by analysis of national, survey, and college-system-level datasets, the authors identify both obstacles to and opportunities for scaling stackable credentials.

Target Audience: Community college faculty and administrators; workforce professionals

How and When to Use It: As a reference on the credentialing landscape that can inform program planning and decision-making

Outcomes: Better understanding of the types of stackable credentials most commonly offered and their labor-market value

U.S. Department of Labor-Employment and Training Administration

Competency Model Tools

Target Audience: Employers, educators, and workforce professionals who seek assistance in identifying the skills needed for success in 21st-century careers



Description: The [DOLETA Competency Model Clearinghouse](#) offers tools designed to help users build their own competency models to use in career pathways and competency-based education programs. The model provides “building blocks” arranged in tiers, each tier containing a set of related competencies. The arrangement of the tiers in a pyramid represents the increasing level of specificity and specialization of content. As a user advances through the tiers of the model, the competencies become specific to certain industries and/or

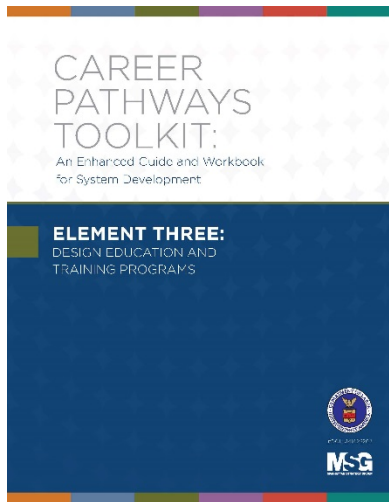
occupations. The tiers are grouped into three categories: (1) occupation-related competencies (management competencies and occupation-specific requirements), (2) industry-related competencies (sector and industry-wide technical competencies) and (3) foundational competencies (workplace, academic, and personal effectiveness competencies).

How and When to Use It: When seeking to build or customize your own competency models or career ladders/lattices

Types of Outcomes: A set of agreed-upon competencies essential for workplace success in a particular industry or occupational cluster

The Career Pathways Toolkit: An Enhanced Guide and Workbook for System Development, Element 3: Design Education and Training Systems

Target Audience: Education and workforce partners connected to the career pathways system who seek to work together in ensuring that local education and training programs align with the skills requirements of growing and emerging industries while simultaneously meeting the education and training needs of diverse populations



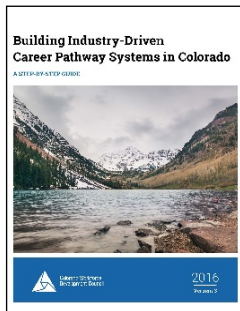
Description: This resource is the [third element in the Career Pathways Toolkit: An Enhanced Guide and Workbook for System Development](#), which was released by the U.S. Department of Labor in 2016. In the spirit of the original (2011) *Career Pathways Toolkit*, the revised version is designed to guide state and local leaders in building, implementing, and sustaining career pathways systems and programs. This element in the revised tool kit is intended to help practitioners (1) identify and engage education and training partners; (2) identify target populations, entry points, and recruitment strategies; (3) review, develop, or modify competency models with employers and develop and validate career ladders/lattices; (4) develop or

modify programs to ensure they meet industry-recognized and/or postsecondary credentials; (5) analyze the state and regional education and training resource and response capability; (6) research and promote work-based learning opportunities within business and industry; (7) develop integrated, accelerated, contextualized learning strategies; (8) provide flexible delivery methods; (9) provide career services, case management, and comprehensive support services; and (10) provide employment assistance and retention services.

How and When to Use It: Use this section to help guide curriculum design, especially when considering target populations.

Types of Outcomes: Curriculum that is more closely aligned with in-demand workplace competencies and presents key concepts in the context of workplace applications

Building Industry-Driven Career Pathway Systems in Colorado: A Step-by-Step Guide (Version 3, 2016)



Target Audience: Workforce development, education, and training organizations and their industry partners involved in designing and building career pathway systems that prepare students and job seekers for careers in their local economies

Description: Developed by the Colorado Workforce Development Council, [*Building Industry-Driven Career Pathway Systems in Colorado: A Step-by-Step Guide*](#) outlines an approach to building career pathway systems that align education and training programs with the needs of the regional

economy to ensure that students and job seekers acquire the skills and experiences necessary to get jobs in the sectors that drive their local economies.

How and When to Use It: Use this guide in the development of pathways designed to prepare students for in-demand occupations.

Types of Outcomes: Up-to-date understanding of critical occupations in targeted industry sectors; a career pathway map that shows students and job seekers employment opportunities in the targeted sector; in-depth information about requirements for success in those occupations; and a shared action plan for education and training providers

Supporting Completion

Stackable Credentials Ideal for Today's Students

Education pathways built on stackable credentials offer today's students' accessible options for earning industry credentials on the road to degree completion. Multiple exit points aligned to employment opportunities help students maximize limited time and financial resources.

Among the stackable credentials programs examined, we have noted common elements designed to facilitate program completion. Examples include the following:

- Scheduling courses to accommodate working students
- Offering courses online
- Awarding credit for prior learning
- Making college affordable
- Assisting students with individualized pathways

Each of these elements is examined in the following sections.

Scheduling Courses to Accommodate Working Students

For working adults, participation in traditional instruction (i.e. delivered on campus during daytime hours) can be difficult. For students who work at night or have childcare responsibilities during the day, the opposite is true. This scheduling conundrum is not new for colleges, but the administrative challenges presented by offering classes “round the clock,” on weekends, or in compressed formats to accommodate working students can be complex.

The colleges in our study adopted a wide range of approaches to scheduling and sequencing courses to address common barriers to student enrollment and persistence.



IDEAS FROM THE FIELD: Creative Scheduling

Taking the shift approach so students can work full-time

Gateway Technical College schedules automotive technology courses in shifts that mirror the structure of work in its Midwest industrial region. Students can enroll in morning courses (7 a.m.–noon), afternoon courses (noon–5 p.m.), or evening courses (5–10 p.m.) while maintaining full- or part-time employment. Gateway presents its curriculum in a concentrated format. Students move through the program one course at a time; each course lasts seven weeks. After completing a course, students move on to the next course in the curriculum. This intensive, focused program (co-designed by regional employers and Gateway faculty) has

worked particularly well for courses in the automotive field. Students progress through training in cohorts, which helps them build professional networks and communities of support.

Offering courses in blocks one night a week

Hillsborough Community College (HCC) structured its engineering technology program to accommodate the needs of commuters. Many HCC students are older working professionals who commute up to 90 minutes for courses to complete stackable certificates in automation, lean manufacturing and pneumatics, and hydraulics. To minimize the potential barrier of such a long commute—and time away from family—the program offers evening classes once a week for four to five hours. Students supplement class-time with online instruction and homework.

Offering daytime courses when childcare is most available

The ICATCH program led by Edmonds Community College (Lynnwood, WA) serves many single parents who have limited educational experience. For these students, attending courses during the day, when affordable childcare is easier to access, works most effectively. Courses are offered two to three times each week—making a regular work schedule possible—and supplemented with online instruction. To ensure round-the-clock accessibility, the college provides a laptop and Wi-Fi card to each ICATCH student.

Offering Courses Online

Online instruction can make programs available to a wide range of students with diverse schedules. Several colleges in the study reported making effective use of this strategy. However, those colleges also indicated that in-person instruction is very important in teaching hands-on skills, building a sense of community, and keeping students on track.



IDEAS FROM THE FIELD: Using Online Learning to Strengthen Stackables

Online lectures and flexible lab times accommodate working students

Owensboro Community and Technical College uses computer simulations and online exercises to support lectures as part of a blended online and classroom-based learning approach—especially for students who are working in internships.

Online coursework helps students complete courses in less time

In the Fast Track version of its logistics program, Harper College combines classroom and online learning to enable students to complete a series of four certificates in supply chain management in one year.

Online courses reduce costs to students

Hillsborough Community College (engineering technology) developed a less costly online version of its Manufacturing Skill Standards Council- Certified Production Technician (MSSC-CPT) certification instruction with the support of a Trade Adjustment Assistance Community

College and Career Training (TAACCCT) grant. After completing the training and sitting for the CPT, students can articulate the first 15 credits of their engineering technology degrees at any Florida community college.

Awarding Credit for Prior Learning

A key feature of stackable credentials programs is their ability to integrate diverse learning experiences, skills, and certificates into a single pathway leading to a degree or other credential. Awarding credit for prior learning supports this kind of integration. It is a proven strategy for increasing credit attainment and degree completion, especially for students facing significant barriers (Council on Adult and Experiential Learning, 2016). The process for awarding credit can be straightforward, such as accepting transfer credits from other academic institutions, but many colleges are finding ways to award credit for other relevant skills and experiences.

To learn more on this topic, view the tutorial “Exploring Credit for Prior Learning,” presented by Jaime Spaciel of Gateway Technical College. The tutorial is available on the Perkins Collaborative Resource Network [website](#).



IDEAS FROM THE FIELD: Credit for Prior Learning

Military service accelerates degree completion

Many of the students enrolled in Hillsborough Community College’s engineering technology program are returning to the college after being out of school for a while or after serving in the military. The college uses prior learning assessments to award credit for skills learned outside of school. The credits then transfer throughout the Florida community college system. Hillsborough’s program manager reported that awarding credit for previous training and experience enabled many students to complete their associate degrees in one year.

Leveraging statewide resources

Westmoreland County Community College uses the [College Credit Fast Track](#) program—a tool developed by the Pennsylvania community college system—to help students apply for credit based on work experience, noncredit training, and military service. Students work with department-level advisors to develop portfolios of experience that combine credentials and credits from other institutions. This process allows students to earn commensurate Westmoreland credits that are recognized throughout the state college system.

Bridge program provides path to degree for certified paramedics

In preparing to implement a new emergency medical services associate degree program, Mitchell Community College in Statesville, North Carolina, recognized the need to serve students who were currently working in the field but needed a little more education to advance

in their careers. The college created an emergency medical science bridge program, which provides a mechanism for certified but non-degreed paramedics to earn the emergency medical services associate degree by completing course requirements outside the paramedic subject area. The program began in August 2017 and recognized its first graduates in December 2017. Most students will be able to complete the program in one year or less because of the articulation of earned certifications.

Making College Affordable

It goes without saying that the cost of college education is a barrier to credential attainment for many students. The decline in state support for public colleges has resulted in tuition increases, exacerbating the affordability problem even at community colleges—historically among the most accessible sources of postsecondary education in the country. (United States Government Accountability Office, 2014).

All the colleges interviewed emphasized the importance of financial aid for stackable credentials programs yet lamented the complexity of making existing financial aid programs work for students enrolled in stackable credentials programs. Several colleges noted that the easiest way to access financial aid is to help students find ways to enroll in school full-time. As discussed previously, programs in our study use creative scheduling coupled with online delivery of course content to minimize seat time on campus and to make instruction accessible and flexible, enabling even working adults to enroll full-time.

Three-quarters of the colleges we interviewed employ students in paid internships or part-time jobs and award them credit for working in industry-related occupations. This helps students maintain full course loads (thus qualifying for financial aid) while earning modest incomes. Internships, co-ops, and/or other forms of part-time or full-time student employment were common among the automotive and manufacturing programs participating in the study, some of which also reported that post-training job offers included tuition reimbursement.



IDEAS FROM THE FIELD: Making College Affordable

Use paid work experience to offset training costs

Students at Harper College and Westmoreland County Community College have the opportunity to participate in apprenticeships. While programs at the two colleges differ in logistics, common to all are that the employer absorbs at least some of the cost of training and that classroom instruction is complemented with on-the-job learning and experience. The apprenticeship is a proven earn-and-learn model in which employers work with individual students or cohorts of students while the students are in training. This means that employers can train students specifically to work in their firms and colleges provide the apprenticeship-

related instruction. Students benefit from apprenticeships because they can earn money while in school and have all or part of their tuition subsidized by their employers.

Supporting students through grant programs

Colleges reported supporting students through direct grants. The ICATCH program, for example, offers eligible students state-funded Opportunity grants that cover the bulk of tuition and fees. Hillsborough Community College and other colleges in a consortium that received a TAACCCT grant developed a separate low-cost non-credit program that allows grant participants to attend online instructor-led MSSC-CPT certification training. Once students attain CPT certification and enroll in the engineering technology program at one of Florida's 19 community colleges, they receive 15 credits toward their degrees.

Make programming eligible for financial aid

One of the biggest expenses for Gateway Technical College's automotive students is purchasing their own tools. Many dealerships in the area expect technicians to own and maintain their own tools, which can present a major financial barrier to getting started in the industry. During the program, Gateway students use the automotive department's tools, but upon graduation they receive their own sets of tools to take to the workplace. The cost of these tools is included in program tuition, along with uniforms and books required for participation. This allows the entire cost of the program, including the purchase of new tools, to fall under a single financial aid-eligible tuition cost.

Integrated earn-and-learn supports working students

Owensboro Community and Technical College arranges both formal and informal internships for the students in its automotive technician associate degree program. Both types of internships usually involve paid work. During a formal internship, a student works two or three days a week in an auto shop while completing academic coursework. During an informal internship, a student will spend one quarter working rather than going to school, with the intention of returning to classes the following quarter. Some of the formal internships are with local employers that require interns to complete the associate degree if they want to continue working for those employers after the end of the internships.

Create pathways for youths and build strong pipelines to college enrollment

Moraine Valley Community College offers a dual-enrollment program in information technology (IT) for high school students. Across Moraine's technical programs, the pipeline from high school to the college is particularly strong: Up to 40 percent of technical program students come from area high schools. While still in high school, IT students can complete their first college certificate in computer maintenance support, worth up to 12 credit hours.

Test Fest offers free certification exams to boost test-taking and credential earning rates

With an overwhelmed testing center unable to handle student demand for certification exams and a student population that couldn't afford exam fees, Rowan-Cabarrus Community College in Salisbury, North Carolina, piloted *Test Fest*. The daylong event offered open lab time during

which IT faculty members proctored certification tests for students who had completed the courses corresponding to the certification. For example, students who completed the entry-level Networking and Security course could sit for the Microsoft Technology Associate Exam in those areas. *Test Fest* allowed students to earn a credential—Microsoft’s technology associate or office specialist—without paying exam or proctoring fees. Rowan Cabarrus students earned a total of 109 credentials during the pilot event. Going forward, the college plans to expand exam offerings and establish a fund under the college’s foundation to support future test fests to ensure exam fees are not a barrier to credentialing.

Assisting Students With Individualized Pathways

Stackable credentials programs are designed to offer students more flexible ways to earn credentials and degrees than traditional education and training programs. By combining online and classroom-based learning with related work experience and prior learning assessments, stackable credentials enable students to advance at their own pace—adjusting the proportions of work and study as needed. Although this individualized approach can meet the diverse needs of today’s learners, programs participating in the study reported that it also requires a more intensive approach to student support services and advising. Every college in our study emphasized the importance of helping students develop clear goals for education and employment, understand how different skills and competencies connect to jobs, and chart a course of study that supports their college and career goals.

Colleges provide this support in different ways, ranging from pathway-aligned coursework to mentoring by faculty members, program staff, and specialty career counselors or navigators.



IDEAS FROM THE FIELD: Creating Clear, Supported Pathways

Design a course that includes career exploration

Moraine Valley Community College offers an introductory course on careers in information technology (IT). Students learn about the different branches and technologies within the IT field (e.g., cybersecurity, mobile, cloud, and database design), the range of employer types (e.g., consulting firms, in-house IT departments, and developer shops), and how different kinds of training lead to jobs. Students are encouraged to think about what kinds of jobs and technologies are most appealing to them and align their course selection with their career goals. Because Moraine offers multiple education and career paths within complex fields, an important first step is helping students identify more precisely what kinds of jobs they find most appealing. Once students have identified their goals, program staff help them identify the most appropriate learning and career pathways. The college offers academic counseling services to all enrolled students through student services programs. The majority of colleges in

the study reported that faculty and program managers of stackable credentials programs also provide intensive career and employment counseling.

One-on-one advising

At Hillsborough Community College, before starting the engineering technology program, students consult with the program manager to review their previous experience and education and goals for training. As students progress through the program, the program manager helps them make choices about coursework and specialty college certificates of credit they may be interested in earning as they work toward their associate degrees.

Strong connections to student support services

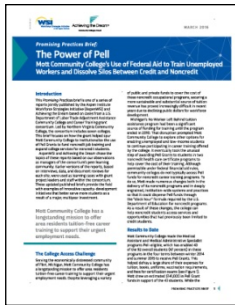
The ICATCH program led by Edmonds Community College uses supplemental grant funding to offer a more formal approach to advising. Program staff members are proactive in monitoring, assisting, and guiding students throughout the program. ICATCH employs a community navigator and engages faculty members as academic advisors. Navigators and advisers work with students to develop their career pathways and serve as conduits to the non-academic assistance they may need—such as childcare, transportation, and housing. ICATCH’s extra advisory services are underwritten by a federal Health Professions Opportunities Grant through the U.S. Department of Health and Human Services.



TOOLS

Promising Practices Brief: “The Power of Pell Mott Community College’s Use of Federal Aid to Train Unemployed Workers and Dissolve Silos Between Credit and Noncredit”

Target Audience: Colleges seeking to increase student access to noncredit career education



Description: This [brief on Mott Community College's use of federal aid](#) is part of a series of reports published by the Aspen Institute Workforce Strategies Initiative (AspenWSI) and Achieving the Dream. Mott Community College (Flint, MI) has a long history of offering area residents tuition-free career training. Securing a substantial and sustainable source of revenue to cover the tuition costs of this training has grown increasingly difficult in recent years because of declining public funds for workforce development. Michigan's No Worker Left Behind tuition assistance program ended in

2010. Mott took the unusual step of awarding Pell grants to students in two noncredit healthcare certificate programs. To do so, Mott made numerous changes in the delivery of its noncredit programs and in college-wide systems and practices so that it could disperse Pell funds through the “clock hour” formula required by the U.S. Department of Education for noncredit programs. As a result, the college can help noncredit students access services and opportunities that had previously been accessible only to credit-seeking students.

How and When to Use It: As a best practice model when seeking to apply Pell Grant funds to noncredit courses

Types of Outcomes: Increased student access to noncredit training at community colleges

Gateway Computer Numerical Control Bootcamp Brief

Target Audience: Educators and employers seeking to improve the employment prospects of underemployed and dislocated adults



Description: This brief describes [Gateway Technical College's Computer Numerical Control manufacturing bootcamps](#) for dislocated and underemployed individuals in the Kenosha, Wisconsin, area. The program simulates the work environment, scheduling classes Monday through Friday from 8 a.m. to 4:30 p.m. and adhering to strict attendance policies. Intensive wrap-around case management services are made available for participants who require help with items such as transportation and childcare. The program includes mandatory tutoring sessions for students who receive a grade lower than a "B" on a test or quiz, résumé writing workshops, and interviewing skill sessions. Business engagement is extensive, impacting curriculum development and review, job placement, and other areas. More than 380 students have completed the program. The manufacturing bootcamp model has been adapted for welding and machine repair technicians and for Gateway's certified nursing assistant (CNA) program.

How and When to Use It: When seeking to implement intensive short-term programs designed to bring prospective employees up to standards sought by employers

Types of Outcomes: Improved qualifications of prospective employees in targeted industries

Awarding Credit for Industry Certifications and Developing Innovative Articulation Agreements: A Brief on Best Practices

Target Audience: Education and workforce leaders who seek to implement processes for awarding college credit for industry certifications



Description: This [brief by the Manufacturing Institute](#) centers around the awarding of credit by community colleges for industry certifications and on the development of supporting articulation agreements. The brief focuses specifically on the industry certifications sponsored by the Manufacturing Skill Standards Council (MSSC) and the National Institute for Metalworking Skills (NIMS). Three partner colleges have established for-credit and dual-credit programs for MSSC courses: Ivy Tech Community College in Indiana, Harper College in Illinois, and Alamo Colleges in Texas. Also included are examples of articulation agreements from Florida, Indiana, and the Alamo Academies in Texas for awarding credit for MSSC certifications. Three partner colleges have developed innovative practices for awarding credit for NIMS certifications: Community College of Baltimore in Maryland, Ivy Tech Community College of Indiana, and Kirkwood Community College in Iowa.

How and When to Use It: When seeking models, templates, and best practices pertaining to the awarding of college credit for industry certifications

Types of Outcomes: Elimination of skill gaps in manufacturing

Sustaining Stackable Credentials

Employing Good Data and Evaluation Practice

Data management is essential to the success of stackable credentials programs—especially when the approach is new to your institution or industry partners. Data can help you understand how implementation is working (or not) and why, so you can adjust accordingly and improve along the way. You will also need data as you seek to broaden support for your programs or to scale or replicate them in other occupations or sectors. Finally, because stackable credentials are a newer approach to supporting training for jobs and careers, shared evidence of effectiveness, success metrics, and models are still emerging. The field needs to learn from your experience as much as you do.

Plan to collect a range of data types depending on the goals your program seeks to achieve. The importance of different data types, the balance between them, and the level of effort each requires will vary with your project’s specific goals and circumstances. Common data categories include the following:

- **Process documentation**, especially for new initiatives. This includes planning-level work—how decisions were made, with what tools, by whom and why, and in what context—and information that would help you or another program replicate and improve the process. It can take the form of meeting minutes, shared files in online workspaces, or photography and video—whatever is needed to document what was done to plan and launch the effort so that others can understand it.
- **Activity-level data** for each program event. This should include duration, sequence, location, structure, time of day, and any other environmental factor that would impact program outcomes.
- **Outcome data** for participants. This should include rates of program completion, credential attainment, job placement (and wages), and participation in further education.
- **Demographic data**, such as ethnicity, gender, age, income, English language proficiency, and use of the Ability to Benefit Test. Demographic data can help assess the effectiveness of the program for different groups and point to areas that need improvement.
- **Experiential data** reported by participants, employers, and other stakeholders. This can take any of several forms—survey responses, interviews, photographs, videos, and even postings on social media. This kind of data reveals important ways to improve programs and conveys the impact of learning experiences in ways quantitative data such as completion rates cannot.

Once you decide what data you need, design a strategy for collecting it. Consider the following as you design your data collection approach:

- **Advance planning**—Data is essential for analyzing program efficacy, but collecting what you need when you need it can pose challenges, especially when data collection is shared among different partners. Work with your partners to identify the data you need and develop a strategy for collecting it. The strategy should include processes for the following:
 - **Leveraging existing data:** Certain kinds of data, such as wages and employment status, are collected by state employment agencies. In recent years, employment agencies in over 30 states have worked with education and human service partners under federal grants on comprehensive databases or connected data systems that track the employment and earnings of participants in public programs over time. Other states have invested in data system improvements and data sharing on their own. Although the laws governing data sharing vary from state to state, most employment agencies can track participant wage and employment outcomes at the individual level and share findings (at least in the aggregate) upon request. Inquire about what data is accessible to you (and in what form). Your institution may be required to have its own data-sharing agreement. Plan to work through the specifics of collection, transmission, and storage in detail. This process takes time, but the result is less duplication of effort across agencies and higher-quality outcome data (that is not dependent on self-reporting).
 - **Following up with students:** Collect survey or other qualitative data from students as they progress through the program, both to inform program improvement and to complement quantitative outcome data. This can be challenging, as it is often hard to reach students after they exit your program. Develop methods for keeping in touch with students, and collect complete contact information so you can reach students in different ways. Consider a range of data collection methods, such as on-the-job interviews, text-based surveys, video diaries, and social media posts. Establish the expectation early on that the program will be following up, explain why, and ask students to sign a statement indicating they understand the importance of follow-up. Students will be more willing to share updates and keep in touch if they understand why information about them is needed.
- **Engaging evaluation partners**—Assessing your program can be done at the project/initiative level, especially when new initiatives are undergoing frequent changes based on real-time feedback. Consider commissioning an evaluation. Evaluations can take many forms—they can focus on process, outcomes, impact, experience, or some combination thereof, and they can be designed to assess efficacy and inform change as the project evolves. Evaluating the effectiveness of your program and assessing its

impact on student outcomes, however, will require a randomized controlled trial or, in some cases, a study that uses a quasi-experimental research design. Evaluators might be project team members assigned to the task or external evaluators who can provide a more objective assessment but typically impose additional costs.

- **Using data to learn and improve**—Reflection is essential for learning and improving, so provide opportunities for program personnel to reflect on the data collected. Periodic debriefings will reveal what data matters most and will help you and your partners interpret the data collected. Key questions would include the following:
 - What worked well/less well for the program? For students? For employers? (Validate with data where possible.)
 - What are the most important outcomes we achieved (or did not achieve)?
 - What do we not know but should know?
 - What insights have we gained that can improve our practice going forward?

To learn more on this topic, view the tutorial “Learning What Works: Data and Documentation in an Evidence-based World,” presented by Kristin Wolff of Social Policy Research Associates. The tutorial is available on the Perkins Collaborative Resource Network [website](#).



IDEAS FROM THE FIELD

Gather information from students

Respondents at Harper College said that three kinds of outcome data would be helpful in assessing stackable credentials: data on credentials completed, industry certifications completed, and the earnings of program graduates. Until recently, community colleges have not been able to access administrative data on employment outcomes for students, due to the confidentiality of this data. Harper currently asks students to provide information directly to the college about their employment status at the conclusion of the program.

Embed individual-level reporting in the curriculum

Moraine Valley Community College has created an information system used to store data on every student who completes the first course in the information technology (IT) department, a required orientation to IT careers. As part of the course, every student builds a career pathway plan, which can be updated. The program tracks every enrolled student by gathering information on progress made over time in realizing career plans.

Considerations for Awarding Credit

Stackable credentials programs are designed to facilitate student progress. One way this can be achieved is by establishing procedures for ensuring that credits can be easily transferred between institutions. Another is to award credit for courses originally taken on a noncredit basis. The methods for addressing this complex issue—how credits are awarded or transferred—are as varied as the communities and employers that community colleges serve. The following examples demonstrate how states and individual colleges are finding solutions.



IDEAS FROM THE FIELD

The advantage to state-level administration

In Florida, the curriculum frameworks developed by the FLATE Center at Hillsborough Community College have been adopted by engineering technology programs (including associate degree and certificate programs) at community colleges across the state. In this instance, a program developed by an NSF ATE center with input from colleges in the state was designated a state model by the state system office. Although this strong state role limits the ability of individual community colleges, like Hillsborough Community College, to initiate new programs on their own, it provides advantages to students. Because the frameworks have been adopted at the state level, Florida students can easily transfer credits from one community college to another or from their associate degrees to four-year colleges. The state gives each community college enough flexibility to determine what credit-bearing credentials it will award and allows each community college to offer up to eight areas of content specialization within the engineering technology associate degree, as needed, to meet the needs of regional manufacturing employers.

The advantage of autonomy

A Westmoreland County Community College staff member expressed both appreciation for the flexibility the school has in developing new courses and programs and regret at the absence of state-level standardization of program curriculum and credentials:

“If the students want to take or build a program or employers are looking for a certain program, we’re flexible enough that we don’t petition a state-level office. In some states, the state board or state administrative office must approve every new class or program. But we don’t have to get state approval. A downside to local autonomy is that we have no uniformity [across colleges]. So, when my student wants to transfer to another state institution or a college, that college doesn’t have to award any credit.”

Because state-level approval is not required, the course and program development process varies from college to college. To prevent what might be called “curriculum sprawl,” colleges establish committees and chains of administrative and/or board-level approval that review

proposed changes. In every case, the college will require justification for the proposed courses, certificates, and/or degrees and their associated costs. New courses and programs may take a year or more to receive the go-ahead. Given the length of time required for approval, many colleges develop new offerings through their noncredit and contract training divisions and then use the resultant outcome data in making the case for offering the same courses and programs on a for-credit basis.



To further explore these issues, view the tutorial “Breaking Down Silos to Build In-demand Pathways: Strategic Use of Non-credit and Credit Offerings to Meet Industry Need and Accelerate Student Success.” The tutorial, presented by Tom Crampton of Mott Community College, is available on the Perkins Collaborative Resource Network [website](#).

Funding Challenges

Even if a community college is fully committed to developing stackable credentials, the laboratory equipment, space, and faculty costs involved in a thorough redesign of program curricula can be prohibitive. Our study respondents indicated that redesigning a program is a multi-year activity that requires intense, focused effort from numerous personnel within the college. Below we describe how the community colleges we consulted have tapped into a variety of funding streams to support curriculum redesign. Without federal grant funding, many of the community colleges in our sample would have had difficulty launching their stackable credentials projects.

Sharing Across Institutions Through ATE Centers

The National Science Foundation’s Advanced Technological Education (ATE) program, now over 20 years old, has been a significant federal initiative in upgrading programs and services in career and technical education. Program funds have supported the development of dozens of national and regional technological education centers. Not only do the ATE centers develop high-quality curriculum in targeted fields, drawing on the expertise of leading educational institutions and industry associations, they also disseminate the curriculum and convene colleges for discussion and training, support professional development for community college and high school faculty, and help educate high school students and the public about career opportunities in high-technology fields.

Enlisting Employer Sponsors Who Are Invested in Student and Industry Success

A number of stackable credentials programs are supported through collaborations with industrial tool suppliers and industry associations. For example, Gateway Technical College has collaborated with its industry partners to become a certified training and testing center for Snap-on and other industry leaders. Gateway provides certified training for Trane, a subsidiary of Ingersoll Rand and a major supplier of heating, ventilation, and air conditioning systems.

Acting as a training and testing center for these major suppliers provides several benefits: The college receives training materials that are ready to be used “out of the box,” can offer industry credentials that are in demand, and receives automatic curriculum updates whenever a product is revised. Moraine Valley Community College reported it also uses curriculums developed by corporations when it offers IT training for well-established software products, such as Cisco and Microsoft programs.

Maintaining Program Currency

The job of reviewing and improving a program’s relevance to industry needs is never completed as technology is always changing and economic conditions are never static. Skills in demand today may soon be obsolete, depending on program area. For colleges with program review cycles that recur only every three to five years, this can present a real challenge.



IDEAS FROM THE FIELD

Increase the frequency and depth of program review

Harper College has learned that it must continue to earmark money in its budget for strategic planning so the process of program review and curriculum revision can be ongoing. Harper’s experience in developing its logistics certificates is instructive in this regard. After initially using labor market data to determine that logistics would be a growing industry in the region, the college invited industry representatives to educate program administrators and faculty about industry trends and in-demand skills. Using this information, the college developed three stackable certificates designed to prepare students for entry-level employment in logistics. Newer data suggests the industry continues to grow and the required level of skills is increasing. The college is currently considering developing an associate degree in logistics. To develop alternatives about what a more advanced program might look like, Harper has hired a full-time logistics program manager with industry experience to research the field and determine how the program can keep pace with the industry.

Concluding Observations

The work of the colleges and organizations that participated in the Mapping Upward project provided numerous insights. Students benefit from certificates and diplomas that can be stacked toward a degree and offer shorter, more accessible pathways to a college credential. Institutions can effectively respond to local industry needs by engaging employers in the design and development of pathways that include multiple exit points aligned to industry-validated credentials. Changes in institutional policies or procedures are often needed to provide stackable credential opportunities for students.

Stackable credentials are not a system, or even a program, in and of themselves. Rather, they are key ingredients in a broader ecosystem that supports career pathways and lifelong learning.

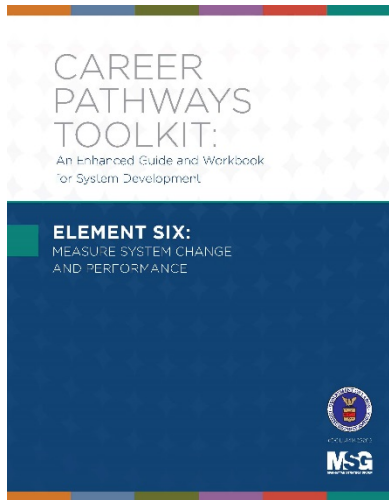
Advocates and partners are critical to the success of this ecosystem—both internally, within the community college, and externally, with employers, industry associations, economic development organizations, and education partners. While many models exist to support the design and development of stackable credentials, ultimately, local context outweighs all else. Your ability to adapt existing models to your local environment—the employer community, economy, and learner populations you support—is what will ensure the credentials ultimately offered improve completion rates and enhance the talent pipeline.



TOOLS

The Career Pathways Toolkit: An Enhanced Guide and Workbook for System Development, Element 6: Measure System Change and Performance

Target Audience: Regional education entities and their partners seeking to build a sustainable, collaborative approach to regional workforce issues



Description: This resource is the [sixth element in the Career Pathways Toolkit: An Enhanced Guide and Workbook for System Development](#), which was released by the U.S. Department of Labor (USDOL) in 2016. In the spirit of the original (2011) *Career Pathways Toolkit*, the revised version is designed to guide state and local leaders in building, implementing, and sustaining career pathways systems and programs. The revised tool kit acknowledges many of the strategic investments made by the USDOL for the purpose of creating and sustaining a demand-driven employment and training system as part of a larger national effort. It incorporates the Career One-Stop competency model as a building block for creating career pathways and

competency-based education programs. The guide references the Career One-Stop Credentials Toolkit as an easy way to search existing industry-recognized credentials. It also includes writeable worksheets to assist teams in career pathways planning and implementation.

How and When to Use It: Use this section of the tool kit to help your partnership define desired system, program, and participant outcomes; identify the data needed to measure system, program, and participant outcomes; implement a process for collecting, storing, tracking, sharing, and analyzing data; and design and implement a plan for reporting system and program outcomes.

Types of Outcomes: Enhanced ability to identify, collect, and analyze program data to improve outcomes of stackable credentials programs

Appendix 1: Glossary

Apprenticeship-related instruction (ARI): Course instruction that meets the classroom training requirements of registered apprenticeship programs. Depending on the program or education institution, ARI can also count as academic credit toward degrees or certificates.

Bridge programs: Designed for individuals who require training or skill enhancement to meet minimum requirements for participation in degree or certificate programs. Bridge programs allow learners to start from their current skill levels and work toward enrollment in training programs they ultimately seek to complete.

Career and technical education (CTE): As defined in the *Carl D. Perkins Career and Technical Education Act of 2006*, the term “career and technical education” means organized educational activities that—(A) offer a sequence of courses that (i) provides individuals with coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in current or emerging professions; (ii) provides technical skill proficiency, an industry-recognized credential, a certificate, or an associate degree; and (iii) may include prerequisite courses (other than a remedial course); and (B) include competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of an industry, including entrepreneurship, of an individual.

Career pathway: As defined in the *Workforce Innovation and Opportunity Act*, the term “career pathway” means a combination of rigorous and high-quality education, training, and other services that: (A) aligns with the skill needs of industries in the economy of the state or regional economy involved; (B) prepares an individual to be successful in any of a full range of secondary or postsecondary education options, including registered apprenticeships; (C) includes counseling to support an individual in achieving the individual’s education and career goals; (D) includes, as appropriate, education offered concurrently with and in the same context as workforce preparation activities and training for a specific occupation or occupational cluster; (E) organizes education, training, and other services to meet the particular needs of an individual in a manner that accelerates the educational and career advancement of the individual to the extent practicable; (F) enables an individual to attain a secondary school diploma or its recognized equivalent, and at least one recognized postsecondary credential; and (G) helps an individual enter or advance within a specific occupation or occupational cluster.

Certificate: Formal recognition of the completion of a course of study intended to teach specific skills usually associated with a professional field or set of related occupations

Competency-based education: A program of study based on the mastery of specific information and skills tied to application in the workforce. Competency-based programs award credentials based on demonstrated ability rather than participation in course instruction.

Dual-credit programs: Allow high school students to enroll in community or technical college courses, receiving both high school and college credit at the same time—credit that can also be transferred to other colleges and universities

Industry-recognized credentials: An industry-recognized credential is one that either is developed and offered by or is endorsed by a nationally recognized industry association or organization representing a sizeable portion of the industry sector, or a credential that is sought or accepted by companies within the industry sector for purposes of hiring or recruitment, which may include credentials from product vendors.

Industry skill standards: The knowledge and skills required for employment in specific industries. Employers or industry boards usually identify and define these skills.

Prior learning assessment: An assessment process that enables students to earn college credit for learning acquired on the job, through professional or military training, online, or through other education programs. Prior learning assessment (PLA) comprises skill tests, written examinations, work portfolio assessments, or some combination and can accelerate credential earning and degree acquisition, especially for nontraditional college students.

Registered apprenticeship programs: Earn-and-learn programs that offer classroom instruction and on-the-job training linked to employment. Employers hosting apprentices are integral to the process and typically hire apprentices who earn their credentials. Apprenticeships can be registered at the state or federal level (or both) and have specific requirements for the number of hours apprentices must participate in classroom and on-the-job training.

Stackable credential: A credential is considered stackable when it is part of a sequence of credentials that can be accumulated over time to build up an individual's qualifications and help him or her move along a career pathway or up a career ladder to different and potentially higher-paying jobs.

Student support services: Services designed to facilitate student success in educational programs. These may include career planning and development, case management, mentoring, coaching and tutoring, work-friendly scheduling, federal and state need-based financial aid, job search skills training, job placement assistance, and referral to providers of other supportive services (e.g., transportation, childcare, and Supplemental Nutrition Assistance Program (SNAP) benefits).

Workforce Innovation and Opportunity Act (WIOA): The 2014 federal statute that establishes federal policy direction and appropriates federal funds for employment and training programs. These programs include training for disadvantaged youths, adults, and dislocated workers; adult education and literacy; employment services and labor market information; and rehabilitation services for individuals with disabilities. Compared to previous legislation, *WIOA* encourages a system-level view of education and training, encouraging blended investments and strong partnerships between programs and agencies serving people who seek to learn, work, or advance in their careers.

Appendix 2: Case Studies in Stackable Credentials

To learn about approaches to stackable credentials across the country, the *Mapping Upward* team studied nine colleges that offer stackable credentials in one or more career and technical education (CTE) programs. Some of the selected colleges had participated in federal projects and received grants to support the development of stackable credentials programs. Others developed their programs independently. Collectively, the colleges offer a broad range of stackable credentials and represent both large and small institutions in urban and rural settings. For each college, we selected one program for study. Our team interviewed one to four representatives from each college. Representatives took part in detailed telephone interviews about their experiences in designing, launching, and maintaining stackable credentials programs. Although all interviews covered the same topics, each respondent was encouraged to tell his or her institution's unique story.

Synopses of programs from six of the interviewed colleges appear on the following pages.

Collin College

Career Pathway: Technology Convergence

Collin College in McKinney, Texas, with seven campuses serving two counties north and northeast of Dallas, enrolls over 50,000 students each year in credit and noncredit programs. Credit programs include both academic programs designed to prepare students for transfer to four-year colleges and universities, and workforce education programs designed to prepare students for immediate entry-level employment or career advancement.

Collin College has substantial experience building stackable certificates into the design of its workforce education programs. Each program offers both an associate degree that requires four semesters of study (60 to 68 semester credit hours) and one or more certificates, typically one year or less in length, that are embedded within the associate degree programs and require the same technical courses as the associate degree. As defined by the Texas Higher Education Coordinating Board, certificates are categorized as “level 1” certificates, which require between 15 and 42 semester credit hours; “level 2” certificates, which require between 43 and 59 semester credit hours; or optional “enhanced skills certificates” requiring between six and 12 semester credit hours that are awarded for skills that extend beyond those required for an associate degree in a particular field. Students who complete certificates gain the technical knowledge and skills required to enter the labor market even if they do not earn degrees. Certificate coursework can be applied toward associate degrees, and students who complete certificate programs can continue their studies or return to complete degrees later.

Within the information technology division, Collin College offers three networking programs, each with its own associate degree: computer networking, Cisco Systems computer networking, and “technology convergence.” The technology convergence field emerged as a result of changing technologies—specifically, the ability to carry audio/voice, integrated data, and video images over the same cable (as in the technology behind voice over Internet protocol or VoIP). Collin College’s convergence technology program includes a 60-semester-credit-hour associate degree and a 30-semester-credit-hour certificate. The program provides students with the skills necessary to design and maintain IP networks that combine voice, video, and data and helps them market themselves in the information and communications technology sector. It also prepares students to take a wide variety of professional certification exams.

Because a majority of Collin College’s students attend school part-time and work part-time, stackable certificates can help students to complete “bite size” chunks at a time, enough to obtain the next job or promotion. Students, in effect, exit and reenter school depending on their circumstances and needs at different times. Over the last five to six years, the college has placed more emphasis on associate degree completion, in an effort to help students access a wider range of career advancement opportunities. Collin College offers scheduling options that make it easier for students to combine work and learning. The college offers “weekend college” programs that permit students to attend courses on Friday evenings, Saturday mornings,

Saturday afternoons, and/or Sunday afternoons. In addition, courses are offered both in standard 16-week semesters and in compressed “express modules” that last either eight weeks or three weekends. Additional flexibility in completing the computer networking programs comes from the use of blended learning models that draw on work completed in virtual computer labs as well as face-to-face classes. Students can complete the virtual labs on their own schedules.

The National Center for Technology Convergence—Collin College’s ground-breaking convergence technology program provided a strong foundation for and has benefited from the presence of the National Science Foundation-funded National Convergence Technology Center (NCTC) located at Collin College since 2004. NCTC, one of a number of sector-based advanced technological education centers established through NSF’s Advanced Technological Education (ATE) program, was formed as a partnership between Collin College and seven other colleges and universities in Texas, Florida, Wisconsin, Michigan, California, and Georgia that were early innovators in developing technology convergence programs. Collin College and its partner colleges have worked together to support NCTC in

- establishing a national business and industry leadership team (BILT) that guides the work of the center to ensure that it remains focused on industry needs and interests;
- working with educators, students, and businesses to meet workforce needs through the promotion and implementation of convergence technology degree and certificate programs in colleges across the nation;
- organizing high-quality professional development activities and providing curriculum assistance to participating colleges;
- creating and providing access to a technology-enabled instructional support system through the convergence college network; and
- developing strategies for increasing the number of students who complete certificates or degree programs and are ready to meet the growing need for skilled specialists.

In recent years, NCTC has received support for its activities from other sources, including a large Trade Adjustment Assistance Community College and Career Training (TAACCCT) grant from the U.S. Department of Labor in IT-related fields and an invitation to participate in the Centers Collaborative for Technical Assistance to community colleges receiving TAACCCT grants. Over time, NCTC has expanded from a relatively small network of participating colleges to a community of practice that shares information and encourages mentoring among the different colleges interested in the field of technology convergence. Collin College is one of the experienced colleges that now act as mentors to schools that have more recently joined the community of practice.

Gateway Technical College

Career Pathway: Automotive Technology

Gateway Technical College is located in the Milwaukee-Chicago corridor in Wisconsin, home to a number of manufacturing firms that serve the automotive industry. The college serves 20,000 students at three campuses and five advanced technology centers in Kenosha, Racine, and Walworth Counties. The automotive technology program is housed at the Horizon Center for Transportation Technology, a state-of-the-art facility for automotive and diesel technician training and aeronautics-pilot training.

The Horizon Center was established in 2007 after discussions involving Gateway's president, the automotive faculty, Snap-on (a global automotive diagnostics manufacturer based in Kenosha), and regional car dealerships and independent auto repair shops revealed three complementary needs:

- Employers of automotive technicians needed a workforce skilled in electronics and in diagnosing and repairing the computer networks that run modern automobiles.
- Snap-on (purveyor of 65 percent of the world's aftermarket diagnostic tools that interface with car computers) needed a better way to train technicians.
- Gateway had an underutilized building and a desire to modernize its automotive curriculum and create a world-class automotive training program.

The Horizon Center is home to both the automotive and aeronautics-pilot training program and the National Coalition for Certification Centers (NC3), a consortium of over 400 community colleges that provide certification guidelines, curricula and professional development for advanced technology transportation programs across the country.

Career Pathway in Automotive Technology—Gateway's automotive technology program comprises a stackable undercar technician certificate (10 credit hours), a stackable automotive maintenance technician diploma (34 credit hours), and an automotive technology associate degree (64 credit hours). As students move through the program, they receive not only academic credits but also industry-recognized certifications that increase their labor market value and employment opportunities while they are participating in the program. After the first semester, students receive the undercar technician certificate and are prepared to take the tests for several industry-recognized credentials. At the end of two semesters, students receive a technical diploma and are prepared to test for additional industry certifications, including the first four certifications available from the National Institute for Automotive Service Excellence (ASE). These credentials qualify them to begin work as automotive technicians with employers in the region.

In four semesters, students can complete the associate degree in automotive technology and sit for a number of industry-recognized credentials from both automotive suppliers and ASE. At

this point in their training, students are considered highly competitive for good paying jobs in regional automotive shops and dealerships. Regional employers work closely with Gateway students and faculty to recruit these students into open positions.

Some students leave the program after two semesters and work full-time. Others continue in the program while also working.

Employer Engagement—Gateway’s automotive technology program has worked closely with many automotive industry suppliers. To promote the delivery of training on the tools and products used in industry, Gateway, along with Shoreline Community College (WA) and Francis Tuttle Technology Center (OK), initiated the National Coalition of Certification Centers (NC3). Tool companies, like Snap-on, see NC3 and Gateway as key partners in certifying students to use their products. Participating companies work directly with NC3 and participating colleges and training centers to support curriculum development, professional development for staff, and competency-based certification processes.

Gateway has long-term partnerships in place with dozens of local companies. Some of these companies are global, like SC Johnson and Snap-on, while others are smaller, with only a local presence. Program faculty members engage local companies (of all sizes) as experts who can ensure quality of training and academic instruction and as employers of student trainees and workers who may need additional professional development. At the same time, Gateway faculty members work individually with dozens of regional employers to understand what they need in skilled technicians so that students are well equipped when they enter the job market.

Accommodation of Working Adults—Because many of the students in the automotive technology program work in jobs that follow a three-shift schedule, the college offers courses in shifts: morning (7 a.m.–noon), afternoon (noon–5 p.m.), and evening (5–10 p.m.). Gateway also structures the courses serially so that students take only one course at a time, over several weeks of concentrated study. The college provides tools and uniforms to use during training; in the final semester students also receive their own tools to take to the workplace. Gateway rolls these expenses into the tuition, which means they can be covered by student financial aid.

Accumulation of Credits and Transferability—Several regional high schools have programs that dovetail with Gateway’s curriculum. High school students who enroll in automotive courses taught by certified instructors using the approved curriculum can receive transferable academic credit toward Gateway’s automotive technology degree.

Looking Ahead—Gateway’s pioneering work with Snap-on and NC3 recently attracted the attention of Fiat Chrysler, which needed more technicians to do basic warranty work. The company is now working with Gateway and NC3 to develop an alternative training model, making Gateway the first college in the country to launch a Fiat Chrysler automotive program.

Harper College

Career Pathway: Supply Chain Management

Harper College, located in Palatine Illinois, one of Chicago's northwest suburbs, serves more than 40,000 students annually, preparing them for technical careers and for transfer to four-year colleges and universities. Harper offers associate degree and certificate programs, advanced career programs, workforce training, professional development, continuing education classes, and accelerated degree options for adults and developmental education programs.

In 2010, the college's strategic planning process led a group of over 100 stakeholders to agree that the college's career and technical programs should be delivered as stackable, industry-relevant credentials. This would (among many other benefits) increase student completions and produce a more aligned, skilled workforce.

Harper College's experience demonstrates what is possible when college leaders enthusiastically support the transformation of career and technical education programs to the stackable credentials model. That model helped departments rethink curricula and how each part of a two-year degree contributed to mastery of skills in a given field. This process encouraged faculty and employer advisory boards to work together closely in considering the progression of courses, the kinds of certificates that would signal the completion of critical skills, and whether and which corresponding industry-recognized credentials should be embedded in training. The college supported this by funding the faculty time and professional development required to transform their programs.

Career Pathway in Supply Chain Management—Supply chain management is the design and management of the processes used to deliver goods and services to customers and consumers. In the Chicago area, this industry cluster has seen and continues to see job growth in entry-level and middle- and high-skill jobs. The region has a large airport, access to waterways (Lake Michigan), and a rail and trucking hub. The supply chain management pathway incorporates four certificates in competency areas (described below) that regional employers identified as critical for success in supply chain occupations. A goal for the coming year is to include industry-recognized credentials and articulate this pathway to an associate degree.

The pathway progression was designed with detailed input from employers. The certificates were designed to match the skills employers said were most in-demand. Increasingly employers are asking for well-rounded employees—so the most comprehensive certificate carries the most value in the labor market.

The first credential is a 12-credit-hour inventory production control certificate. Upon completion of this certificate, a student is work-ready for several kinds of entry-level, mid-wage jobs. However, the goal of the college is for students to layer the next three certificates: purchasing (12 credit hours), physical distribution (12 credit hours), and supply chain

management (18 credit hours). The planned pathway will extend up to an associate degree with transfer options to regional bachelor's degree programs. Because industry representatives have said they value the added validation of industry certifications, the college is planning to add more industry-recognized credential preparation to the academic program.

Employer Engagement—Industry partners have been involved in Harper's career pathway in supply chain management from its inception. As a first step, the college's logistics and transportation department sought input from industry representatives to learn what skills were required for work in the logistics field and in what order it made sense to learn them. Guided by this information, the college developed an academic curriculum comprising four small certificates that stack up into a one-year certificate in supply chain management.

Accommodation of Working Adults—Almost half the students enrolled in Harper's supply chain management certificate courses are incumbent workers seeking to upgrade their skills. To serve those working students, the supply chain courses are taught through Harper's Fast Track program. Fast Track is an accelerated, part-time program that meets once a week from 6 to 10 p.m. Students usually enroll in only one or two courses at a time, so the amount of time they have to spend on campus is minimal. The program is offered in a small cohort format, so students get individual attention from instructors and can form peer support networks.

Looking to the Future—To bolster its investment in the logistics program and its partnerships with regional employers, Harper hired a full-time program manager to work closely with industry on the development of the associate degree. The program manager, who comes to the college from industry, meets with employers several times a month both individually and in groups. Her job is not just to solicit information on coursework but also to build stronger relationships. Longer-term goals of the program include increasing internship and apprenticeship opportunities and strengthening connections between students/workers and employers.

Moraine Valley Community College

Career Pathway: Information Security Program

Moraine Valley Community College, located in Palos Hills, Illinois, in the southwest suburbs of Chicago, is the second-largest community college in Illinois, with an enrollment of 36,000 students. The programs in the college's computer integrated technology department serve high school students, traditional community college students, dislocated workers, and industry professionals. Within this field, *information security* has emerged as a specialized program area. To support the development of its information security associate degree program, Moraine Valley sought and received funding from the National Science Foundation's Advanced Technological Education (NSF ATE) program.

Moraine Valley uses stackable credentials throughout its career and technical education programs. The information security specialist program offers a 63-credit associate degree. On

their way to the degree, students can complete two professional certificates in IT security and over 20 certifications. In addition to industry-recognized certifications, the college offers professional certifications in Microsoft, Linux, Oracle, VMware, and other software. These certifications are bundled as stackable certificates. Students who come into the program with these certifications already in hand are awarded credit for the corresponding Moraine Valley courses.

Career Pathway in Information Security—In designing its information security program, Moraine Valley focused on the development of two professional certificates. A 21-credit-hour network security associate certificate includes a core curriculum that can be completed in two semesters and prepares graduates for employment as network security technicians, network firewall technicians, VPN administrators, and remote security communication support specialists. A 36-credit-hour information security associate certificate designed for returning professionals (who already have associate or baccalaureate degrees and are working in IT) prepares graduates for employment as IT security specialists, firewall and VPN specialists, and data assurance specialists. The program concentrates on industry requirements in healthcare, finance, and other fields that use electronic commerce.

The 63-unit IT associate degree is roughly the equivalent of stacking the two professional certificates and adding general education credits. During the third semester of the associate degree curriculum, students begin to specialize in such areas as information security, mobile security, and infrastructure support and virtualization. Moraine Valley's information security program links students to related courses, academic certificates, industry certifications, and associate degrees offered within the department, including courses in the computer and local area network technician and voice and data specialist associate degree programs.

Employer Engagement—Moraine Valley faculty in the IT division work closely with an employer advisory board to guide curriculum development; build relationships with companies; and encourage networking, internships, and job opportunities. What makes Moraine Valley's employer advisory board unique is that it usually includes program graduates who have advanced to executive and managerial positions with regional companies. This is by design. Program alumnae have a good understanding of the knowledge and skills of students coming out of Moraine's IT program and know how the program is structured.

Accommodation of Working Adults—The entry-level certificate, information security associate, was designed to provide a credential that students who want to work part-time or full-time can use to go out and get a job. Although the first certificate covers only the first three courses in the information security program, it was designed to help students find employment in jobs related to their training programs. One Moraine Valley respondent stated this: "Our research shows that if they're working in the field of study, they're probably going to be much more successful, so we feel it's a win-win situation for us."

Moraine Valley also uses an activity called “Agree to Degree” to encourage students in the middle of associate degree programs to finish those programs. For this activity, the college hosts a day during which they bring in former students to talk about the benefits of completing a degree.

Accumulation of Credits and Transferability—Moraine Valley maintains a strong link to IT career and technical education programs at the high school level. Through dual enrollment, students can earn up to almost a full semester, or twelve credit hours, that count toward completion of an IT program. Moraine Valley is also successful in enrolling recent high school graduates. Between 35 and 40 percent of students enrolled in Moraine Valley’s IT program begin their studies directly after high school.

Moraine Valley has developed formal articulation agreements with several four-year colleges in the state. The college faculty also advises students about the possibility of transferring to schools without articulation agreements, even though they are unlikely to get two full years of credit for the two years spent in the associate degree program at Moraine Valley.

Westmoreland County Community College

Career Pathway Initiative: Advanced Technology Center

Westmoreland County Community College (WCCC) serves about 5500 full- and part-time students, with a main campus in Youngwood, Pennsylvania, about 40 miles southeast of Pittsburgh. WCCC also operates nine education and training centers. The college offers 63 associate degrees, 13 diplomas, and 55 certificate programs.

In 2014, WCCC opened a new Advanced Technology Center to house its “industry-driven” programs, which include mechatronics, advanced and additive manufacturing, energy, and machining and fabrication, among others. This multi-use facility (current enrollment over 400) houses classrooms for credit-bearing courses for degrees and certificates offered in the college’s Technology, Manufacturing, and Engineering Sciences Division, as well as career and technical courses for students enrolled in local high schools and customized and contract training for incumbent workers at local companies. WCCC offers associate degrees in 14 technology programs, such as welding, machine technology, computer numerical control technology, mechatronics systems, electronics engineering technology, robotics, and other specialized fields, as well as a more general associate degree in applied industrial technology.

WCCC has embraced stackable credentials as the desired model for each of its manufacturing programs. Within each associate degree, WCCC has developed, or will develop, at least two stackable credit-bearing certificates.

Career Pathway in Mechatronics—The mechatronics program at WCCC includes a 65-credit associate degree. The program includes 17 credits of general education requirements and 48 credits of the technical curriculum. Along the pathway to the associate degree, students can earn three stackable certificates and a one-year technical diploma. Students typically complete

the general education courses during the first semester. After completing the first semester (16 credits) of the technical curriculum, a student is awarded a “mechatronics systems operator” certificate. After completing 32 credits of the technical curriculum, the student has earned a mechatronics systems technician I (MSTI) certificate and a one-year technical diploma. A third certificate—mechatronics systems technician II (MSTII)—is awarded upon completion of the next 16 credits (completing the full 48 credits of the technical curriculum).

Although programs are set up to accumulate credits that lead to an associate degree, at the Advanced Technology Center they “see success as jobs.” Students often leave the program before they graduate because they got good jobs. Faculty encourages students to take jobs, and then encourage the employers to pay for those students to continue their education.

WCCC designed its mechatronics program around the Siemens Mechatronic Systems Industry Certification Program (SMSIP) in Germany. The Siemens level 1 and level 2 certifications have been integrated into the WCCC curriculum for the mechatronics systems technician I and II (MSTI and MSTII) academic certificates.

Employer Engagement—The Advanced Technology Center has strong relationships with both large and small manufacturers in the region. Some firms come to WCCC and the Advanced Technology Center for customized training for their workers. Very large employers, such as Westinghouse Electric, prefer to hire individuals who have associate degrees. Other employers are interested in the specific certificates an individual has completed. One local utility company recruits individuals after their first year in the associate degree program and provides them with a paid ten-week work-study program. The company then pays for those recruits to come back to school for another year to complete the associate degree.

Accommodation of Working Adults—The Advanced Technology Center operates under the assumption that most students are there to get jobs. If a student chooses to start directly into a technical stackable credential, he or she is allowed to do that without taking general education classes or taking a placement test of reading, writing, and math skills. This allows students who have been out of school to experience success (by earning a certificate) and get used to being in school before they make the commitment to pursue an associate degree. The instructors also provide career counseling.

Accumulation of Credits and Credit Transfer—WCCC awards credit and an initial industrial technology certificate to high school students who have completed career and technical education programs in manufacturing fields. In addition, entering students are often awarded credits toward a technology program on the basis of previous training or education. The number of credits awarded is determined by assessments performed at the college’s testing center.

Because Pennsylvania does not have a governing board for community colleges at the state level, each community college makes its own transfer decisions and has its own internal processes for initiating programs. This allows each college to develop programs that are

responsive in its own region. WCCC follows the credit guidelines set forth by the Middle States Accrediting Institution.

Students interested in transferring to baccalaureate programs in mechatronics can apply to one of two four-year mechatronics programs in Pennsylvania. An articulation agreement has been completed with Pennsylvania College of Technology. An agreement is in process, but not yet completed, with California University of Pennsylvania.

Looking Ahead—WCCC hopes to develop a two-year pre-engineering degree that would articulate to four-year engineering schools.

Hillsborough Community College

Career Pathway: Engineering Technology

Hillsborough Community College (HCC) has six campuses in Hillsborough County, Florida, which is in the Tampa-St. Petersburg-Clearwater standard metropolitan statistical area. **HCC is the host college for the Florida Advanced Technological Education Center of Excellence (FLATE) and has been one of the lead colleges in FLATE's activities. (FLATE is described in the following section.)**

Starting in 2009, HCC redesigned its manufacturing technology program to conform to the state's new curriculum framework for the 60-unit associate degree in engineering technology (ET). At the time of our interview, HCC offered a single area of specialization for the degree—advanced manufacturing—and five college certificates of credit: **(1) automation; (2) lean manufacturing; (3) pneumatics, hydraulics, and motors for manufacturing; (4) engineering technology support specialist; and (5) computer numerical control (CNC) machinist (12 to 20 credits each).** The college is planning to add a 30-credit certificate in mechatronics.

Although most of the students in the program attend school part-time and work part-time, a high percentage of the students are working toward an associate degree and will complete it, though it may take up to five years. HCC encourages students to work toward a degree but also welcomes students who only want to earn certificates. The program is designed to accommodate nontraditional students, most of whom must balance work and education. For example, all ET classes start at 3 p.m. or later, and most are held only once a week for three to six hours. To help onboard potential students, the college also provides voluntary noncredit remediation modules in math as well as inexpensive noncredit courses with online instruction that enable participants to complete the MSSC certified production technician (CPT) credential quickly at about half the cost of the regular college for-credit courses. This credential can be transferred to any of the Florida Community College ET programs for 15 credits. ET faculty members also provide personalized counseling.

Employers provide input to curriculum development and provide formal and informal internships. The formal manufacturing internship is a two-credit course. Internships are scheduled close to the end of a student's coursework for the associate degree. The company

pays interns' wages. Many interns transition to regular full-time positions at the conclusion of their internships. Students participating in formal internships are covered by the college's liability insurance policy.

The development of state-approved standardized curriculum frameworks for each of the courses in the ET program has ensured statewide articulation of all courses. Our respondent at HCC confirmed that this has led to widespread collaboration. "We cross-register students when they need a course that is available at another college. We share equipment, we share whatever—books, slides, and instructors. Many times an instructor teaches at two or three colleges."

The Florida Advanced Technological Education Center (FLATE)—FLATE was initiated in 2004 and funded through the National Science Foundation's Advanced Technological Education program. FLATE supports community colleges in Florida by developing career pathways in engineering technology (ET) and building bridges between academia and industry partners. FLATE has worked with community colleges, manufacturers, and manufacturing associations throughout Florida to design curriculum frameworks for a 60-unit ET associate degree and 21 college certificates of credit (CCC) that can be awarded by colleges that offer the ET associate degree. The ET associate degree program is built on a common core (18 credits) that is closely aligned with a national industry credential—the MSSC certified production technician. (The core curriculum prepares students to take the MSSC CPT exam, and people who have passed the exam anywhere in the country receive credits when they enroll in the ET program.) The CCCs (12 to 20 credits each) use state-approved curriculum that is part of the ET associate degree, the "culminating" degree at the community college level.¹ Each community college can offer up to ten specializations within the ET associate degree.

The curriculum frameworks, approved by the Florida Department of Education Career and Technical Education Programs Division, comprise standards and benchmarks that govern all ET CTE programs (K–14) in the state. Because of state-level approval of the curriculum frameworks and uniform course numbering, credits articulate easily between community colleges throughout the state. Articulation agreements have also been developed with four-year engineering programs at the University of South Florida, Daytona State College, Purdue Calumet, Florida Agriculture and Mechanical University, and several state colleges in the Florida College System.

FLATE is helping to promote the visibility of the ET degree both to prospective students and to employers and is reaching out to link high schools and school districts to participate in the preparation of students for ET career pathways. FLATE offers professional development to secondary and community college faculty in ET content and training in the tools and equipment used in industry.

¹ A CCC is an academic (credit-bearing) certificate that is intended to prepare a student for a specific job in the regional economy. It is not a college degree but is a subset/part of a college degree. It may be aligned with and prepare students to complete an industry-recognized credential.

Appendix 3: Abbreviations

ARI	Apprenticeship Related Instruction
ASE	Automobile Service Excellence
AspenWSI	Aspen Institute Workforce Strategies Initiative
ATE	Advanced Technological Education
BILT	Business-Industry Leadership Team
CCC	College Certificate of Credit
CNA	Certified Nursing Assistant
CNC	Computer Numerical Control
CPT	Certified Production Technician
CTE	Community College Career & Technical Education
Department	U.S. Department of Education
ET	Engineering Technology
FLATE	Florida Advanced Technological Education Center
GTC	Gateway Technical College
HCC	Hillsborough Community College
IRC	Industrial Relations Committee
IT	Information Technology
MSSC	Manufacturing Skills Standards Council
MSTI	Mechatronics Systems Technician
MSTII	Mechatronics Systems Technician II
NC3	National Coalition for Certification Centers
NIMS	National Institute for Metalworking Skills
NSF ATE	National Science Foundation's Advanced Technological Education
OCTAE	Office of Career, Technical, and Adult Education
OCTC	Owensboro Community and Technical College
PCC	Piedmont Community College
PLA	Prior Learning Assessment
SMSCP	Siemens Mechatronic Systems Industry Certification Program
TA	Technical Assistance
USDOL	U.S. Department of Labor
WCCC	Westmoreland County Community College
WIOA	<i>Workforce Innovation and Opportunity Act</i>