

# Designing and Delivering Career Pathways at Community Colleges

## A Practice Guide for Educators

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# Designing and Delivering Career Pathways at Community Colleges

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# Introduction to the Practice Guide on Designing and Delivering Career Pathways at Community Colleges

In today's labor market, students increasingly need greater levels of postsecondary education and training to enter or advance in many industries.<sup>1</sup> Meanwhile, employers are calling for the education system to better align with industry needs, as their demands for a skilled workforce continue to rise.<sup>2</sup> Specifically, employers are seeking higher-skilled workers who can be flexible, learn new skills on the job, and generalize their skills to work across different job categories.

In response to the increasing emphasis for postsecondary institutions to prepare students for family-sustaining employment in high-growth, in-demand industries, community colleges are employing a number of strategies to meet the needs of both job seekers

See the [Glossary](#) for a full list of key terms used in this guide and their definitions. These terms are underlined when first introduced in the guide.

and employers. Many of these strategies are found within career and technical education (CTE) programs, and they are also present in broader workforce development activities and supports offered by community colleges.

Career pathways have gained momentum as a key strategy for comprehensively and systematically enhancing CTE. Career pathways are structured around a sequence of connected educational and training programs that provide students with basic skills and occupational knowledge that align with industry needs. When designed and delivered well, career pathways combine that occupational training with comprehensive support services that enable students to advance toward higher levels of education and family-sustaining careers. The U.S. Department of Labor's Trade Adjustment Assistance Community College and Career Training (TAACCCT) grant program supported several new and existing CTE programs in community colleges to develop or expand career pathways. Other examples

## **Career Pathway** (as defined in the Workforce Innovation and Opportunity Act)

(7) CAREER PATHWAY.—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;
- 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 1 recognized postsecondary credential; and
- G. helps an individual enter or advance within a specific occupation or occupational cluster.

SOURCE: 29 U.S. Code § 3102 Definitions

include: The U.S. Department of Health and Human Services invested in career pathways through its Pathways for Advancing Careers and Education (PACE) and Health Profession Opportunity Grants (HPOG) programs. The Corporation for National and Community Service’s Social Innovation Fund has supported the Bridges to Career Opportunities career pathways program. The Joyce Foundation’s “Shifting Gears” initiative is an example of an early investment in planning career pathways. A consortium of foundations helped to advance career pathways work through the Accelerating Opportunity initiative.

The career pathways approach, as defined under the Workforce Innovation and Opportunity Act (WIOA) and reinforced under the Strengthening Career and Technical Education for the 21st Century Act (Perkins V), has become widely used in education and workforce development.<sup>3</sup> Because of the emphasis on career pathways in CTE programs for the past decade and the availability of rigorous evaluation results on this topic, this practice guide is focused on community college-based CTE interventions through the lens of career pathways.

Developed by the **What Works Clearinghouse™** (WWC) in conjunction with an expert panel, this guide draws upon studies of interventions that include one or more of the career pathways components defined under the WIOA. It focuses on promising interventions where there is evidence of improved educational or labor market outcomes. This guide provides community colleges with five specific recommendations for supporting occupational skills training through career pathways (see **Table 1** below).

## Who Might Find This Guide Useful?

This guide is designed to be used by administrators, staff, and faculty at community colleges who are responsible for overseeing, designing, and/or implementing CTE initiatives.<sup>4</sup> The recommendations in this guide will also be useful for policymakers who work with community colleges, staff at American Job Centers, leaders of community-based organizations, and foundations interested in supporting workforce development strategies at community colleges. This guide may also be of interest to employers, labor unions, and industry associations that wish to collaborate with community colleges to design or operate workforce development strategies that are responsive to the current and future preparation and training needs of the modern workforce.

Finally, the evidence that supports the recommendations in this guide has the potential to promote conversations among researchers about the availability of rigorous research on best practices related to career pathways strategies, and where there are research gaps that should be addressed.

## Using Evidence to Develop the Recommendations

This practice guide adds to the existing body of literature on career pathways by synthesizing the evidence from group design studies to make five evidence-based recommendations around how to design and deliver career pathways to support students’ educational and labor market success. Each recommendation includes examples of career pathways strategies and components and how to implement them, advice on how to overcome potential obstacles, and a summary of the research evidence that supports the recommendation.

**Box 1. Study eligibility criteria**

Eligible research (1) used a comparison group design; (2) included an intervention with a primary focus on developing the technical skills and knowledge required for specific jobs or fields of work; (3) involved students enrolled in community college, or in a program sponsored by a community college, in the United States; (4) was published in 1999 or later; and (5) reported on one or more outcomes in the following domains: (a) credit accumulation, (b) postsecondary degree attainment, (c) attainment of a credential (e.g., certification, license, or certificate), (d) academic performance, (e) technical skill proficiency, (f-h) short-, medium-, or long-term employment, or (i-k) short, medium-, or long-term earnings.

The expert panel created a practice guide protocol to guide the evidence search and review.<sup>5</sup> Under that protocol, findings from eligible studies (see **Box 1**) that meet evidence standards were summarized by trained and WWC-certified reviewers for consideration by the panel. The number of studies identified, screened, and reviewed is summarized in Figure B.1 (see **Appendix B**).

**Box 2. Levels of evidence**

**Strong:** There is consistent evidence that meets WWC standards and indicates that the practices improve student outcomes for a diverse population of students.

**Moderate:** There is some evidence meeting WWC standards that the practices improve student outcomes, but there may be ambiguity about whether that improvement is the direct result of the practices or whether the findings can be replicated with a diverse population of students.

**Minimal:** Evidence may not meet standards or may exhibit inconsistencies, but the panel determined that the recommendation must be included because the intervention is based on strong theory, is new and has not yet been studied, or is difficult to study with a rigorous research design.

After considering the evidence, the expert panel drafted the recommendations and assigned a level of evidence to each (see **Box 2**).

The five recommendations and the panel's strength-of-evidence assessment are shown in **Table 1**.

**Table 1. Recommendations and corresponding levels of evidence**

Practice Recommendation	Level of Evidence		
	Minimal	Moderate	Strong
1. Intentionally design and structure career pathways to enable students to further their education, secure a job, and advance in employment.		●	
2. Deliver contextualized or integrated basic skills instruction to accelerate students' entry into and successful completion of career pathways.		●	
3. Offer flexible instructional delivery schedules and models to improve credit accumulation and completion of non-degree credentials along career pathways.	●		
4. Provide coordinated comprehensive student supports to improve credit accumulation and completion of non-degree credentials along career pathways.		●	
5. Develop and continuously leverage partnerships to prepare students and advance their labor market success.		●	



Throughout the practice guide, the authors refer to the specific interventions that were examined in the twenty-one studies that met WWC standards provide the evidence for this Practice Guide (see **Table 2**). Readers can refer back to this table to get a refresher of some of the intervention details. Recommendation 1 is supported by 12 studies, while Recommendation 2 is supported by nine studies. Six studies support Recommendation 3, while 15 studies

support Recommendation 4 and 11 studies support Recommendation 5. The number of student participants in the studies ranged from 124 to 42,984. While these studies met WWC standards and informed the evidence-based recommendations in this practice guide, it is important for readers to know that the authors do not endorse any interventions or programs featured in the studies.

**Table 2. Overview of Studies Providing Evidence to this Practice Guide**

Intervention	Study	# of Students	Recommendation				
			1	2	3	4	5
Accelerating Opportunity	Anderson et al. (2017) <i>Additional source: Anderson et al. (2015)</i>	42,984	•	•		•	•
ACED Grant at Salt Lake Community College	Bragg et al. (2018)	1,448					•
Advancing Careers and Training (ACT) for Healthcare in Wisconsin	Price et al. (2018)	3,376	•				•
Career Focused Learning Communities	Visher & Teres (2011)	917			•		
Carreras en Salud	Martinson et al. (2018)	800	•	•	•	•	•
Grand Rapids Community College Pathways to Prosperity	Martinson et al. (2016) <i>Grand Rapids Community College</i>	274	•			•	•
Integrated Basic Education and Skills Training Program (I-BEST)	Glosser et al. (2018)	631	•	•		•	
	Modicamore et al. (2017) <i>Accelerating Connections to Employment</i>	2,168	•	•		•	•
Kern Community College Clean Energy Center	Martinson et al. (2016) <i>Kern Community College District</i>	816	•	•		•	•
Madison Area Technical College Patient Care Pathway	Cook et al. (2018)	500		•		•	
Making the Future: The Wisconsin Strategy	Price et al. (2016)	6,300	•	•		•	
New Visions Self-Sufficiency and Lifelong Learning Project	Fein & Beecroft (2006)	1,043			•	•	
North Central Texas College Health Matrix Grant scholarship program	Martinson et al. (2016) <i>North Central Texas College</i>	984				•	
Northeast Resiliency Consortium	Price et al. (2017)	1,396				•	
Nursing STRIPES	Curl et al. (2016)	124			•		
Pathways to Healthcare	Gardiner et al. (2017)	1,217	•	•	•	•	

Intervention	Study	# of Students	Recommendation				
			1	2	3	4	5
Project QUEST	Roder & Elliott (2018) <i>Additional sources:</i> Roder & Elliott (2019) Elliott & Roder (2017)	410				•	•
ShaleNet	Dunham et al. (2016)	353	•				•
VIDA Program	Rolston, Copson, & Gardiner (2017)	958				•	
Workforce Training Academy (WTA) Connect	Hamadyk & Zeidenberg (2018)	943	•	•	•	•	•
Year Up	Fein & Hamadyk (2018)	2,544	•				•

## Overarching Themes

In developing the practice guide, the expert panel identified five overarching themes that hold relevance across multiple recommendations. These themes represent important issues or topics that the expert panel believes are important to consider when developing and implementing career pathways. The five themes are:

- **The importance of understanding the student population.** When planning or updating a career pathway, administrators, faculty, and staff should carefully consider the student population they both target and serve. It is important for community colleges to understand their student population and what students need in order to be successful when pursuing a career pathway. By understanding the student population, community colleges and their partners are better able to successfully design and deliver career pathways that provide appropriate forms of instruction and support services to accommodate students with different needs and capabilities. As described more fully under the individual recommendations, understanding the student population facilitates connecting students to pathways that align with their academic interests and career goals (**Recommendation 1**), determining appropriate teaching strategies for basic skills training (**Recommendation 2**), identifying needs for

flexible course scheduling and instructional delivery formats (**Recommendation 3**), and assessing student needs for different types of academic and non-academic supports (**Recommendation 4**).

- **The importance of aligning career pathways to industry needs.** The panel believes that aligning career pathways to industry needs is another important theme that cuts across several of the recommendations. The skill sets and levels of preparation required for successful employment vary considerably from one industry to another, and even from job to job within an industry. Therefore, career pathways that prepare students for manufacturing jobs will differ from those designed to prepare students for healthcare jobs, for example. When considering the recommendations in this guide, community colleges and their partners should determine how best to apply the recommendations in their efforts to prepare students to thrive in the evolving industries students are pursuing. The panel provides guidance on aligning career pathways with industry needs as part of designing career pathways content and curriculum, structure, and credentials (**Recommendation 1**), as well as sustaining and leveraging industry partnerships to provide hands-on learning opportunities to prepare students and advance their labor market success (**Recommendation 5**).

- **The need for faculty professional development.** The panel recognizes that several of the recommendations in the present practice guide may require professional development for career pathways faculty. High-quality instruction is a key component of effective career pathways. Most of the studies supporting the recommendations in this practice guide were of interventions that targeted and served older students.<sup>6</sup> For this reason, the panel believes all faculty can benefit from pedagogical training that specifically addresses adult learning theory and pedagogies for effectively teaching adult learners, thereby enabling them to meet students' diverse learning needs. The panel provides more guidance on professional development for faculty as part of supporting occupational and basic skills instructors that are team teaching and delivering integrated basic skills training (**Recommendation 2**), instructors designing and delivering flexible instructional delivery models (**Recommendation 3**), as well as faculty and staff coordinating and collaborating around delivery of student supports (**Recommendation 4**).

Many CTE programs hire industry experts to teach occupational courses because they have technical content knowledge. Yet, many of these experts lack teaching experience or the necessary credentials to teach at the college level. As such, additional funding and training may be necessary to support faculty development, especially when such faculty are first transitioning out of industry and into teaching. The expert panel believes training of faculty should cover practical tips for generating syllabi, delivering instruction, and creating assessments. Further, administrators should also consider providing peer mentors for new faculty and encouraging professional communities of practice. Faculty in occupational programs who do not have an advanced degree can pursue one through degree programs for workforce

educators. For example, South Seattle College offers a Professional Technical Education & Instructional Design program that prepares its participants for technical teaching positions at community and technical colleges.<sup>7</sup>

- **The importance of adequate time and resources.** The panel believes that community college faculty and staff need ample time and resources to collaborate as they design and deliver career pathways instruction. Faculty should be involved in designing career pathways to ensure that one program adequately prepares students for the next program along the pathway. Faculty and staff must also be afforded opportunities to identify student needs and coordinate supports that will meet those needs. The panel brings particular attention to the importance of time and resources in relation to curriculum redesign and development (**Recommendation 1**), collaborative planning and delivery of team teaching and contextualized basic skills training (**Recommendation 2**), design and delivery of flexible instructional models and formats (**Recommendation 3**), coordination and collaboration between staff and faculty around student support services (**Recommendation 4**), and establishment of sustained employment focused partnerships (**Recommendation 5**).

The panel recognizes that funding for career pathways is not equal at all community colleges, and that recent national events requiring increased remote teaching and learning may have exacerbated inequalities across community colleges even further.

- **Opportunities for more rigorous research on the effectiveness of career pathways.** This practice guide focuses on components of career pathways that are implemented at—or in partnership with—community colleges. Much of the available research on career pathways at the community college level

focuses on interventions that result in non-degree credentials for students initially lacking the math, reading, or writing skills required to successfully complete college-level work. To date, few rigorous studies report on medium- and long-term educational or labor market outcomes. The panel believes that more research is needed on the full spectrum of career pathways interventions, including those that extend beyond the community college to include long-term outcomes. The panel provides guidance on examining the delivery and outcomes of contextualized and integrated basic skills training (**Recommendation 2**), monitoring students' needs and use of flexible instructional scheduling and delivery models (**Recommendation 3**), evaluating students' need for and use of support services (**Recommendation 4**), and assessing benefits and challenges of partnerships with local employers and industry partners (**Recommendation 5**).

The panel recognizes that community colleges vary in their capacity to collect and use data to understand student progress and outcomes in career pathways. CTE researchers can support community colleges to better understand the types of data they should collect to examine their students' education and employment outcomes throughout an entire career pathway. When feasible, the expert panel believes colleges should use administrative and program implementation data to assess student demand for certain programs and to understand rates at which students persist, complete, and transition from career pathways programs to employment.

### How to Use This Practice Guide

Each recommendation focuses on a particular aspect of designing and delivering career pathways at community colleges. For each of the five recommendations in this guide, we include the following:

- **The recommendation:** Details about the recommended practice, example career pathways strategies, level of evidence, and a description of how the recommended practice supports student outcomes. Appendix C contains a detailed rationale for the level-of-evidence category assigned to the recommendation (*strong*, *moderate*, or *minimal*), and information on the individual studies that support it. Each recommendation also includes a **“Highlight From the Field”** that provides additional implementation detail from one of the supporting studies. All figures and mentions of specific community colleges in this guide are offered as examples only and should not be read as endorsements of specific products or approaches.
- **How to Carry Out the Recommendation:** Guidance on how to implement the recommended practice. This guidance is informed by the studies that support the recommendation as well as the expert panel's expertise and knowledge of resources and strategies available to help implement the recommendation.
- **Potential Obstacles and the Panel's Advice:** Advice from the expert panel about design and implementation challenges and how readers should overcome them.
- **Tools and Resources:** Examples related to the guidance for how to carry out the recommendation.

The guidance on how to carry out each recommendation is presented in a sequence. However, not every step will be appropriate to every audience, nor is every step required in order to implement a recommendation successfully. Users of this guide are encouraged to use the advice provided here in ways that fit best into the varied contexts in which they work. Though this guide does not provide step-by-step instructions for implementation, readers will find resources mentioned throughout providing more details about how to apply particular practices.



## Recommendation 1: Intentionally design and structure career pathways to enable students to further their education, secure a job, and advance in employment.

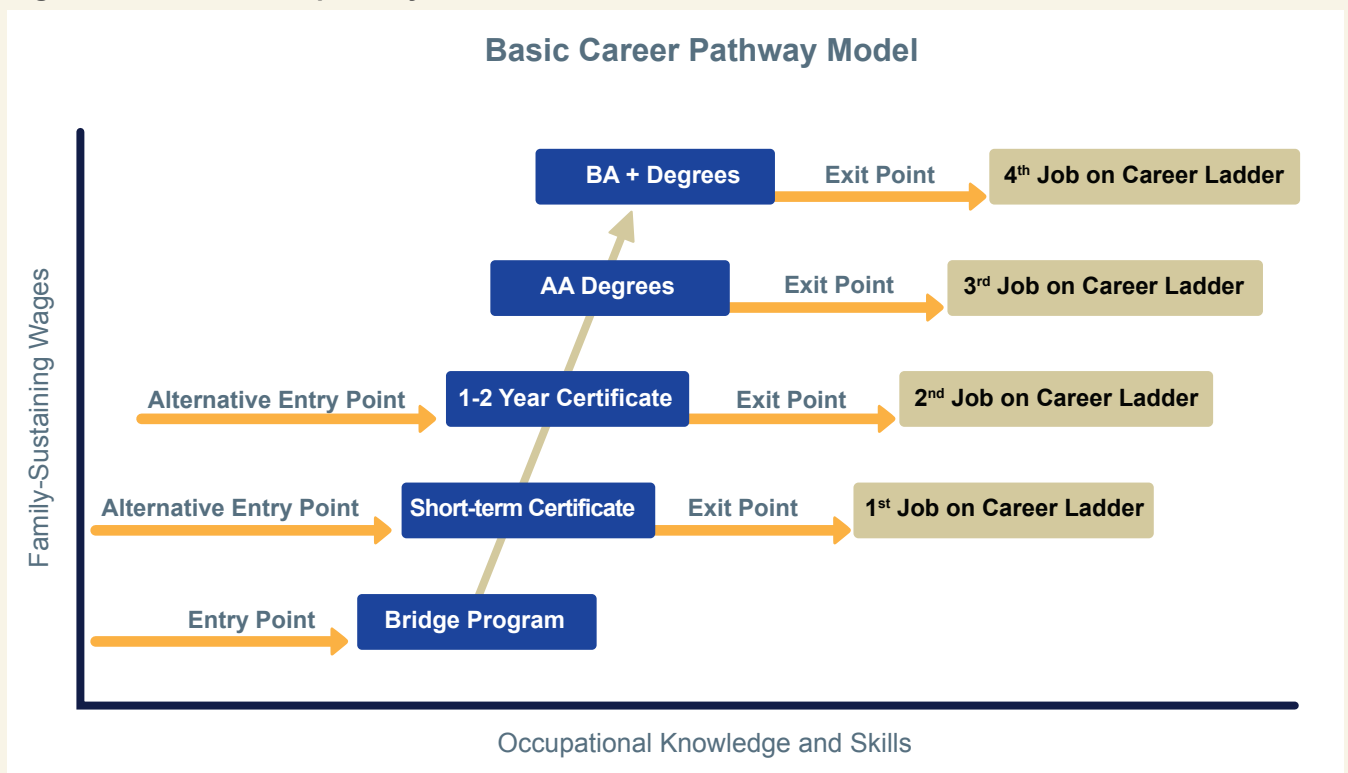
Career pathways can be designed and implemented in many different ways. Their structure and content will vary depending on the occupations and industries targeted; the skills and knowledge required for employment in these occupations and industries; and the education and training programs needed to meet these requirements. Across occupations and industries, what career pathways have in common is that they comprise a series of connected education and training opportunities that enable students to secure a job or further their education or employment.

When designed and implemented well, career pathways offer students a clear blueprint for educational and employment advancement. A basic career pathway model includes multiple

entry points to facilitate access to training in occupational skills and knowledge valued by employers and stackable credentials that match labor market demand (**Figure 1.1**). Multiple exit points aligned with employment opportunities offer participants flexibility to access employment at different stages of the career ladder. Individuals may enter and exit career pathways at multiple points as they advance in their careers.

The flexibility of pathways enables students to start at a level commensurate with their skills. Therefore, not all students will start at the first level in the model. Bridge programs, which are typically preparatory courses offered to students in need of basic skills, such as math, reading, or writing, are not always offered at the beginning of career pathways.

**Figure 1.1. Basic career pathway model**



Source: Adapted from Alliance for Quality Career Pathways (2014), Fein (2012), and Wachen et al., (2010).

## Recommendation 1

Clearly defined career pathways allow students to see how their progression through individual educational and occupational training programs can lead to specific employment opportunities—providing students with an encouraging roadmap. Each step of the career pathway is designed for students to successfully progress to the next level of education and employment. Student access and progression along the career pathway can be further motivated by simplified enrollment and intake procedures and smooth transition points between training and education.

WWC staff and the expert panel assigned a *moderate* level of evidence to Recommendation 1, based on 12 studies of interventions with career pathways components. Eight of the studies<sup>8</sup> meet WWC group design standards without reservations, and the other four studies<sup>9</sup> meet WWC group design standards with reservations.

In all 12 of the studies used to support Recommendation 1, career pathways are a major component of the tested intervention. See [Appendix C](#) for a detailed rationale for the level of evidence assignment for Recommendation 1.

This section describes strategies, examples, and tools that can support the intentional design and delivery of career pathways that enable students to enter and advance in employment and further their education. These career pathways can be developed by community college administrators, faculty, and staff, in partnership with employers and industry stakeholders. All figures and mentions of specific community colleges in Recommendation 1 are offered as examples only and should not be read as endorsements of specific products or approaches.

**Table 3. Results of Meta-analysis for Recommendation 1**

Outcome Domain	Statistically significant and positive	Indeterminate	Statistically significant and negative
Credit accumulation	●		
Postsecondary degree attainment			●
Industry-recognized credential attainment	●		
Short-term employment	●		
Short-term earnings	●		

Note: Across the 12 studies, there were findings in five outcome domains even though all 11 outcome domains (see Box 1) were relevant for this recommendation. None of the 12 studies included findings that meet WWC standards in the following outcome domains: (1) academic performance; (2) technical skill proficiency; (3) medium-term employment; (4) long-term employment; (5) medium-term earnings; or (6) long-term earnings.

## How to Carry Out the Recommendation

The guidance below is informed by the studies that support the recommendation as well as the expert panel’s knowledge of strategies and resources available to help implement the recommendation.

### 1. Align career pathways to industry needs.

When developing career pathways, community colleges should assess and identify regional industry needs to ensure the pathways will provide students with the occupational skills and knowledge that employers demand.<sup>10</sup> The expert panel suggests community colleges should focus on developing career pathways that effectively lead to higher credentials and associated wages with each step. Labor market information can be used to identify the specific occupational fields—and the jobs within these fields—that are in demand, provide family-sustaining wages and benefits, and offer opportunities for advancement within a region or state. Community colleges developing career pathways should collaborate with employers and industry partners to review labor market information and consult them to identify occupations for which training is needed.<sup>11</sup> The questions in **Figure 1.2** can guide the review of labor market information by bringing attention to in-demand skills and knowledge that employers are looking for, growth industries and occupations, as well as the training needed to access these. The specific questions are meant to serve as examples and can be modified to community colleges’ local needs and contexts. Community colleges seeking more information may wish to explore resources from Corporation for a Skilled Workforce, such as their toolkit that offers more in-depth guidance to understanding and applying labor market data.<sup>12</sup>

**FIGURE 1.2. Sample uses of labor market information**

- What skills are employers looking for?
- What are the skill requirements for different levels of positions, such as entry- or mid-level, in the industry?
- What training or education would an individual need for specific occupations or clusters of occupations?
- Which occupational areas are growing – now and in the future?
- Which industries are hiring – now and in the future?
- Are the jobs in these industries living-wage?
- What are the salary levels?
- Are there opportunities for job advancement?
- What factors can help/stop individuals from getting a job?
- What are working conditions like for specific industries?

Source: Adapted from *Career Pathways Toolkit: An Enhanced Guide and Workbook for System Development* (2016) available at [https://careerpathways.workforcegps.org/resources/2016/10/20/10/11/Enhanced\\_Career\\_Pathways\\_Toolkit](https://careerpathways.workforcegps.org/resources/2016/10/20/10/11/Enhanced_Career_Pathways_Toolkit)

With a firm understanding of industry needs, community colleges are better positioned to align career pathways content and curriculum, structure, and credentials. This ensures students develop in-demand skills and knowledge, they have multiple successive entry and exit points, and they can pursue in-demand job opportunities at multiple levels. Beyond reviewing labor market information, a training gap analysis can help community colleges and their partners identify priorities for developing or improving training available through career pathways. The Training Gap Analysis Matrix featured in **Figure 1.3** can guide both analysis and discussion of topics such as preferences community colleges and their partners have for training content, delivery models, and length. The information

Figure 1.3. Training gap analysis matrix

Industry:						
Career Pathway:						
Key Occupations in the Pathway	Key Training Content (competency areas)	Preferred Training Delivery Model(s)	Preferred Training Length	Required Credentials	Associated Equipment or Software Requirements	Other Notes (instructor competencies, etc.)
{lower-skill occupations}						
{middle-skill occupations}						
{higher-skill occupations}						
Source: A Practical Guide to Developing Career Pathways, <a href="https://www.michigan.gov/documents/ted/R5_5_MICPFramework_20180730_629836_7.pdf">https://www.michigan.gov/documents/ted/R5_5_MICPFramework_20180730_629836_7.pdf</a>						

for the individual career pathways can be organized according to lower, middle, and higher skill occupations, facilitating an overview of the training gaps at different levels of the career pathway.

It is essential that employers and industry partners provide input into the design of training and curriculum included in a pathway. An important role for employers is to keep community colleges informed of skill needs and what credentials prepare students for in-demand jobs. This may require dedicated time for continuous program alignment work. Through employer

engagement strategies, such as advisory committees, community colleges can engage employers and industry partners in pathway development and periodic reassessment of pathway competencies and credentials.<sup>13</sup> Further, ongoing assessment of pathways provides opportunities to add additional in-demand training options.<sup>14</sup> Finally, collaborating with industry partners provides an opportunity for mutual accountability between community colleges and employers in that colleges commit to developing skilled workers that employers commit to employing.



### 2. Define and create accessible pathways with clearly defined entry and exit points.

Career pathways options that are clearly defined enable students to see how the education and occupational training along a pathway can lead to specific occupations or clusters of occupations. This is especially important since today's students rarely follow a linear path to program or degree completion, and often stop-in and stop-out along the way. Pathways are most accessible to students when they have clearly defined entry and exit points.<sup>15</sup> Contextualized basic skills instruction, offered through either bridge programs or integrated training models such as those described in **Recommendation 2**, can facilitate entry into career pathways. When pathways align with in-demand occupations within an industry sector, colleges can optimize the chance that students acquire the skills and knowledge needed to earn a credential and gain employment.

Well-designed career pathways provide students with opportunities to continuously build or “stack” content knowledge and in-demand credentials as they progress along the pathway. Stackable credentials promote vertical movement to the next-higher-skill job in a sector, with each new credential providing a new set of skills to master. The Office of Career, Technical, and Adult Education's *Introduction to Stackable Credentials* offers an overview of stackable credentials and how they relate to career pathways and programs of study (see **Figure 1.4**). Programs of study and career pathways share many of the

same attributes. The two terms are used interchangeably in many state and local applications. Both terms are defined in federal laws supporting workforce development and career preparation.

Pima Community College's Pathways to Healthcare Program created five pathway programs (medical office, nursing, medical and physician support, emergency medicine, and other).<sup>16</sup> The steps of each pathway were designed to be stackable, so as to ensure students acquired the necessary prerequisites and associated credentials as they advanced along the chosen pathway. Each level of a pathway, as shown in the **Highlights from the Field** below, culminates in associated credentials that recognize student progress. For example, a student entering the first step in the nursing pathway must complete instruction and clinical work (and pass a licensing test) to earn the nursing assistant credential in Level 1, which prepares the student either for employment as a nursing assistant or to advance to the patient care technician program in Level 2.

A student entering the pathway with a higher skill set than is needed for Level 1, as measured by the TABE or ACCUPLACER assessment, might enter the nursing pathway at Level 2. Conversely, a student with very low skills would start the pathway in a pre-pathway bridge program. The pre-pathway bridge offerings in Pima's Pathways program, including a 10-week College Readiness Course or access to a self-paced College Readiness Lab, prepare students to be successful in Level 1 coursework.

**Figure 1.4. Pathways to Career Readiness and Advancement**

**Programs of Study** and **Career Pathways** share many of the same attributes. The two terms are used interchangeably in many state and local applications. Both are defined in Federal Law.

#### A CAREER PATHWAY

combination of rigorous, high-quality education, training, and other services.

Attributes:

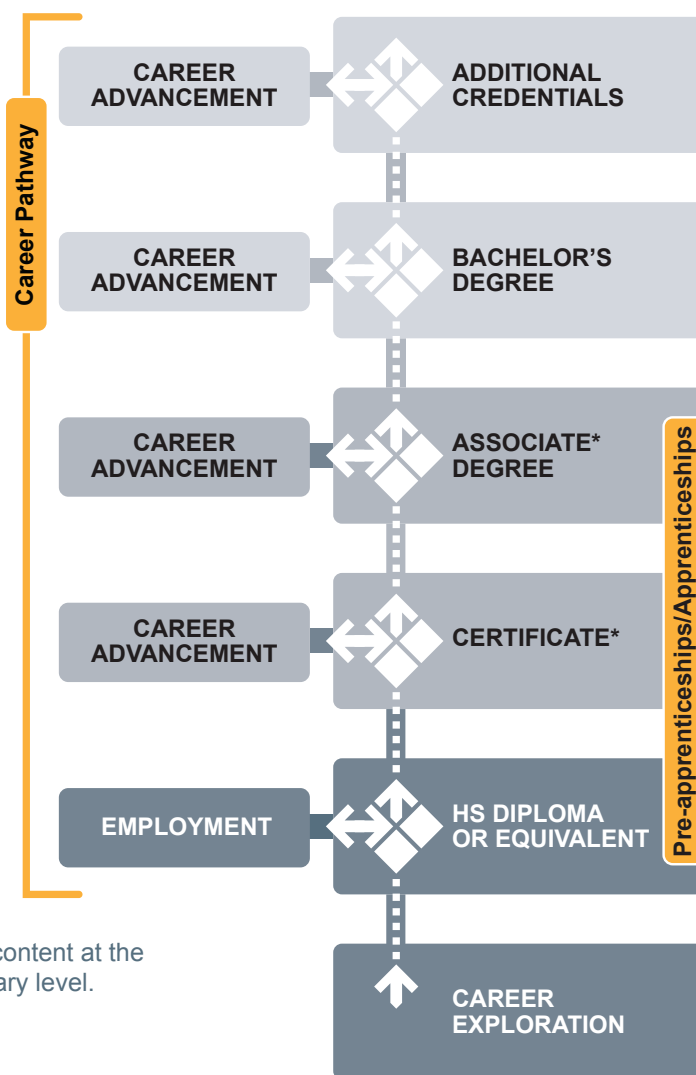
- Industry alignment
- Secondary and postsecondary credential attainment
- Enables entry and advancement in specific occupations or occupational clusters
- Education in the same context as workforce preparation
- Acceleration of educational and career advancement
- Preparation for success in secondary/postsecondary education options and apprenticeships
- Counseling services

#### A PROGRAM OF STUDY (POS)

is a coordinated, nonduplicative sequence of academic and technical content at the secondary and postsecondary level.

Attributes:

- Industry alignment
- Postsecondary credential
- Multiple entry/exit points
- Academic, technical, employability skills
- Challenging standards
- Progressive content specificity
- Career guidance



#### STACKABLE CREDENTIALS

At these milestones the learner may advance to the next-higher-skill job in the sector for which they have trained, and/or continue in or reenter the learning pathway to pursue additional credentials.

\*These stackable credentials may:

- Include preparation for industry certifications.
- Articulate to bachelor's degree programs.
- Be obtainable by HS students through dual credit.

#### CAREER EXPLORATION

Begins no later than 8th grade and is an integral part of instruction for:

- Career and Technical Education (CTE)
- Integrated Education and Training (IET)
- Adult Basic Education (ABE)
- Adult Secondary Education (ASE)
- English as a Second Language (ESL)

Source: U.S. Department of Education, Office of Career, Technical, and Adult Education (2021).

## Highlights from the Field

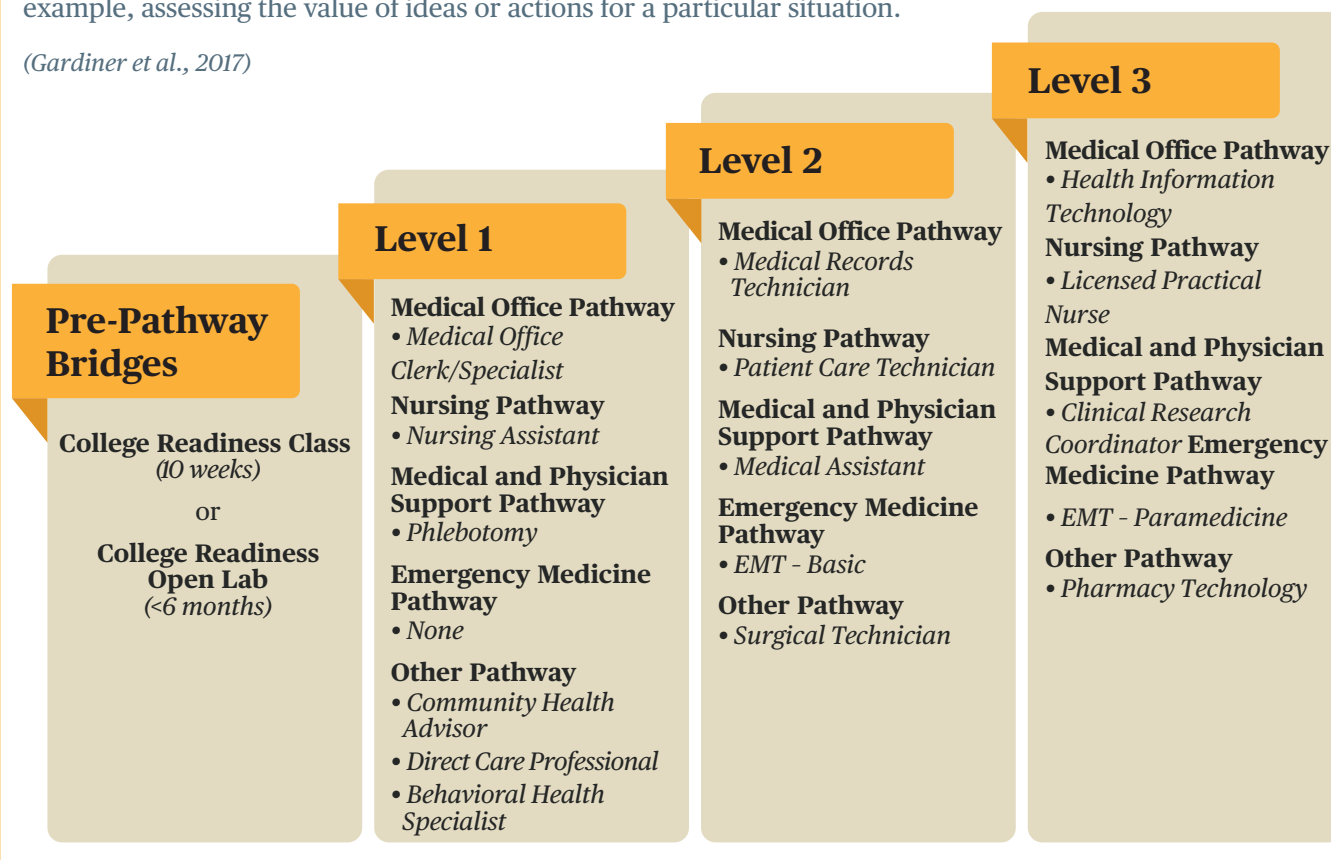
### Mapping health career pathways at Pima Community College

Under the Health Profession Opportunity Grants (HPOG) demonstration program sponsored by the Administration for Children and Families, PIMA Community College (PCC) and the Pima County One-Stop (PCOS) mapped 16 existing healthcare occupational training programs into five career pathways, each incorporating a ladder that enables students to obtain stackable credentials. The five pathways were Medical Office, Nursing, Medical and Physician Support, Emergency Medicine, and Other pathways.

The Pathways to Healthcare program was intentionally designed to be easier for advisors to explain and for students to understand how completing one credential could lead to a higher credential and higher paying job. Within each pathway, programs were designated as entry level (Level 1), mid-level (Level 2), or advanced level (Level 3). Programs within each pathway were structured so that Level 1 programs included all pre-requisites for Level 2 ones, and Level 2 programs included pre-requisites for Level 3 ones. For example, Nursing Assistant (Level 1) instruction and clinical work was completed before that for Patient Care Technician (PCT, Level 2), which enables a nursing assistant to also work in hospitals rather than just in nursing homes.

With the Pathways to Healthcare program, PCC tied student learning outcomes to expected outcomes in the industry, with each level indicating greater mastery. Level 1 programs, for example, equipped students with basic occupation-specific *knowledge*—such as recall of data—and *comprehension*, such as understand the meaning, translation, and interpretation of instructions and problems. Level 2 programs required *application of knowledge and skills*, such as applying what was learned in the classroom to new workplace situations. Level 3 programs focused on (i) *analysis*—for example, breaking something down into its parts; (ii) *synthesis*—such as creating something new by putting together different ideas; and (iii) *evaluation*—for example, assessing the value of ideas or actions for a particular situation.

(Gardiner et al., 2017)



Another approach to developing stackable credentials is creating short-term trainings within existing programs. This allows students to earn shorter-term credentials that facilitate entry-level employment while also allowing credits earned in the short-term trainings to apply toward subsequent credentials within a program. Wisconsin's *Making the Future* TAACCCT 2 consortium grant, for example, led sixteen technical colleges, in partnership with employers and workforce development groups, to embed short-term certificates or credentials within longer-term "parent" programs, allowing students to receive targeted technical training in a short period of time.<sup>17</sup> Students who "job-out" of the pathway to seek employment in their field of study can continue to progress

toward a technical diploma or associate's degree because they can apply their previous embedded credential courses and credits toward the parent program.<sup>18</sup>

Community colleges can also design career pathways that enable students to pursue a career lattice. Unlike a vertical career ladder, a lattice can involve lateral moves in the labor market. When presented in a graphic, lattices—like career pathways maps—can help students visualize career opportunities and understand the postsecondary education and training needed to ensure their skills align with a wide variety of labor market opportunities. As the example in **Figure 1.5** shows, students completing an associate's degree in early childhood education (ECE) are

**Figure 1.5. Sample Pennsylvania Early Learning Keys to quality career lattice**

Career Lattice Level		Positions						
		Child Care/ School-Age Care	Early Head Start / Head Start	Private Academic Schools	Public School District	Early Intervention	Consultant/ Instructor/ Mentor	Higher Education Faculty
VIII	<b>Ph.D/Ed.D in:</b> ECE/ equivalent degree OR in related field including 30 ECE credits OR any field with ECE Certification	Director, Lead Teacher/ Group Supervisor	Director/ Coordinators/ Classroom Teachers	Administrator/ Director/ Teacher	Administrator (including principal certification)/ Social Worker	Therapist/ Case Management Director/ Supervisor/ Early Interventionist/ Teacher	TA Consultants/ Instructors	
VII	<b>Master's in:</b> ECE/ equivalent degree OR related field including 30 ECE credits OR Elementary Ed. and 18 ECE credits OR any field with ECE Certification							
VI	<b>BS/BA in:</b> ECE/ equivalent degree OR related field including 30 ECE credits OR Elementary Ed. and 18 ECE credits OR any field with ECE Certification							
V	<b>AA/AAS in:</b> ECE/ equivalent degree OR related field including 18 ECE credits OR Elementary Ed. and 12 ECE credits OR unrelated degree (BS/BA/AA/AAS) including 30 ECE with articulation agreement		Home-Based Teachers/ Home Visitor	Assistant Teacher	Teacher Including ECE or E/Ed Certification	Service Coordinator	Mentors	
IV	30 credits including 12 ECE credits OR ASB/AST degree in ECE				Teacher Aide/ Para-Professional			
III	Credential, Diploma, Certificate or 6 ECE credits							

Source: <https://qrisnetwork.org/sites/all/files/conference-session/resources/MaureenMurphySession215PPTasPDF.pdf>



qualified for a range of positions in a variety of settings, each of which could lead to a more advanced career step with additional education and training and/or experience.

Community colleges can support latticing by offering a core curriculum for a particular sector and then allowing students to take different directions along the pathway upon completion of the core requirements. For example, the Clean Energy Center program offered by the Kern Community College District (KCCD), one of the largest community college districts in the United States, required all students to take a six-week foundational training course that introduced them to the tools and equipment used in the field. This course was designed to provide students with a set of technical and transferrable skills that they could apply beyond the renewable energy sector.<sup>19</sup> In establishing the center, KCCD's Workforce Development Division drew on its long history of partnering with local Workforce Investment Boards (WIBs) and employers to offer non-credit workforce training (see also **Recommendation 5** on sustaining partnerships with industry partners).

Community colleges can also offer students mobility to move in and out of the labor market at each level of credentialing. Returning to the nursing pathway at Pima Community College, for example, instead of moving immediately to the patient care technician program in Level 2, a student who earned a nursing assistant credential in Level 1 might work for a while first.<sup>20</sup> That mobility also can allow students to consider shifting to another, related field of study when they do return to school. It is important to remember career pathways often are not linear, as the path chosen by an individual student is dependent upon their individual needs, including personal circumstances and professional goals.

When defining and creating a given career pathway, the expert panel recommends community college administrators and staff need to do a thorough assessment of course requirements, offerings, and scheduling to ensure students can access the courses they need in the timeframe they need them.<sup>21</sup> Institutional research may shed light on students' course-taking patterns and inform pathway design. Students approaching transition points along a pathway may require extra supports to make sure they do not encounter barriers to progression (see **Recommendation 4**).

Some community colleges have developed career pathways by starting with an assessment of existing programs. As one example, the Patient Care Pathway program developed by Madison Area Technical College, a community college with extensive experience operating bridge programs, adapted and linked existing programs at the college to create three 1-semester academies offering low-skilled students an accelerated pathway into their chosen healthcare program.<sup>22</sup> The shared aim of the three re-designed academies was to accelerate student progression by combining basic skills and occupational courses (see **Recommendation 2** on integrated basic skills training).

### **3. Allow sufficient time for curriculum development and approval, but seek accelerated approval when feasible.**

If new courses will be required for a pathway, community colleges will need to allow sufficient time for curriculum development and approval. The procedures and timelines for developing a course vary by state, by institution, and whether the course is intended to be for credit or not. However, given advancing technologies and the need to respond more rapidly to employer demands, institutions are employing a variety of approaches to accelerate curriculum design and approval.

Some institutions have found success incubating pathways and courses through their continuing education or non-credit programs, and later seeking approval to offer these pathways as part of new or existing degree programs. Colleges that use this approach should remember to consider non-credit to credit articulation processes that will allow students who went through non-credit workforce training programs to move into degree programs without having to retake courses.<sup>23</sup>

The panel encourages college administrators to carefully review their program development steps and processes to identify institutional roadblocks that could potentially be removed. They can also consider whether there are any fast-track program approval options in their state, which may facilitate their efforts to respond more quickly to industry changes. Some states have delegated curriculum approval processes to the local level. In California, for example, the Curriculum Committee of the Academic Senate of California Community Colleges developed guidance for local senates to ensure effective curriculum approval processes (see **Figure 1.6**).

Regardless of how long curriculum approval can take, it is important to allocate faculty and staff sufficient time to engage in quality curriculum development. One way to do this is to release faculty from teaching responsibilities to collaborate with employers. It is also important to ensure faculty and deans have time to coordinate with each other to ensure that all the pieces of a career pathway fit together and that one step along the pathway adequately prepares students for subsequent steps.

Further, the panel recommends assessing the scope of curriculum development required and selecting a reasonable amount of new curriculum to develop at one time.<sup>24</sup> When enhancing an existing program, as opposed to

developing an entirely new program, ongoing engagement with employers may allow faculty to make small, incremental changes over time that would not require external approval.

**FIGURE 1.6. Sample recommendations for ensuring effective curriculum approval processes**

- Review and evaluate the effectiveness of local curriculum processes.
- Ensure that local senate purview over curriculum and the connection between the local senate and the curriculum committee are well-understood.
- Ensure that the curriculum committee structure includes a diverse array of faculty, academic administrators, students, and staff that can provide a variety of expertise and perspectives without weakening faculty primacy over curriculum.
- Ensure that the process for the initiation of new curriculum and revisions to existing curriculum is clear, the technical review process is streamlined and effective, and curriculum committee meetings are run efficiently.
- Streamline the curriculum approval process by ensuring a sufficient frequency of curriculum approval opportunities by the curriculum committee and the governing board, establishing an expedited approval process for time-sensitive proposals, and providing individual colleges in multi-college districts autonomy over their curriculum.
- Provide professional development at the appropriate level for faculty, administrators, students, and staff, with more detailed training provided to those most closely involved with the local curriculum process.
- Advocate for sufficient resources to support the work of the college curriculum team, including reassigned time or additional compensation, and for the provision of ongoing funding and access to professional development opportunities.
- Ensure that faculty initiators of distance education proposals are provided with professional development on effective practices for ensuring regular and effective contact and compliance with accessibility requirements.

Source: Academic Senate of California Community Colleges, <https://www.asccc.org/papers/ensuring-effective-curriculum-approval-processes-guide-local-senates>

In making any changes, it is important to ensure they are aligned with the most current information about what students need to succeed and advance in jobs.

The DACUM (“Developing a Curriculum”) process is one structured approach to developing a new curriculum—or revising an existing one—with the input of employers and industry leaders. DACUM incorporates the use of a focus group in a facilitated storyboarding process to capture the major duties and related tasks included in an occupation as well as the necessary knowledge, skills, and traits. Once an occupational profile is created and validated, a task analysis is conducted to further define a job. Both are used to develop a curriculum.<sup>25</sup> Developing a “Business and Industry Leadership Team” (BILT) is one way to extend beyond the DACUM process to continually involve a group of employers by engaging them to annually review—and suggest changes to—existing courses within a program.<sup>26</sup>

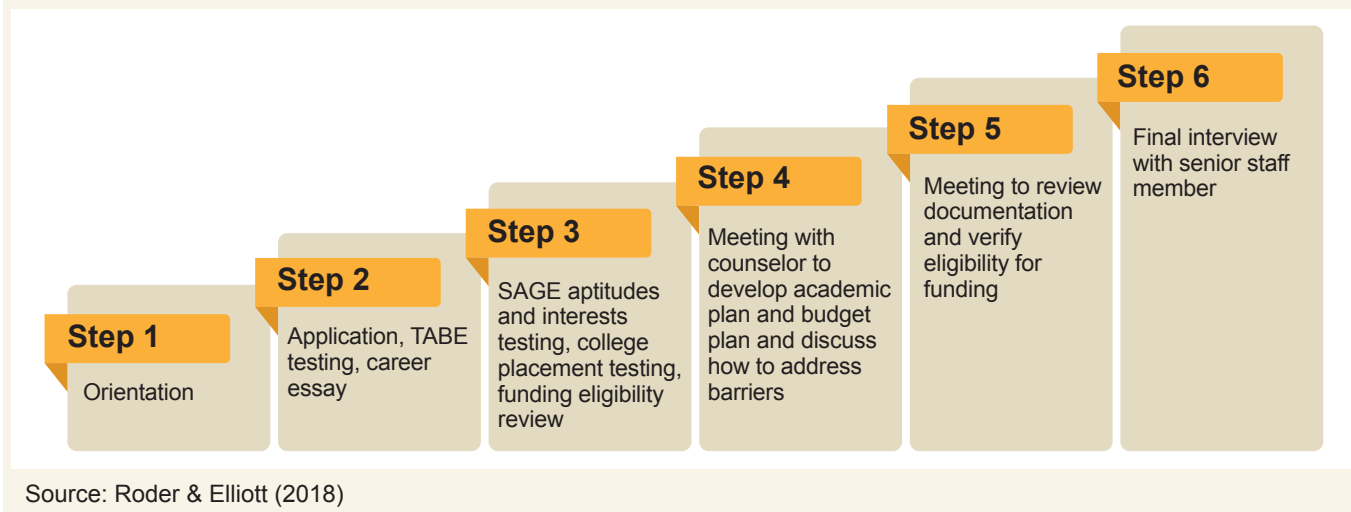
#### 4. Connect students to pathways that align with their knowledge, skills, educational interests, and career goals.

Students interested in pursuing a career pathway can benefit from recruitment and intake procedures that are designed

to assess their knowledge, skills, and educational and employment background as well as their career aptitude and goals.<sup>27</sup> These opportunities help students better understand their strengths, areas of growth, and aspirations, thereby helping them determine—as they better understand pathway options and relevant career opportunities along the way—whether those pathways are a good fit for them.

Intake processes may also be used to assess student interest and readiness to commit to attending courses, both of which enhance a student’s engagement and increase the likelihood that they will be successful in progressing along a pathway. Intake processes may include applications, skills assessments, career interest assessments, one-on-one counseling, and career coaching.<sup>28</sup> For example, Project QUEST in San Antonio, implemented by a partnership between two local community organizations and the Alamo Community College District, involves a rigorous six-stage intake process (see **Figure 1.7**), within which each student meets one-on-one with an occupation-specific counselor to evaluate the student’s career aptitude and interests, personal background and aspirations, family and work situation, education and employment history, and

**Figure 1.7. The Project QUEST intake process**



placement test scores, among other topics. Students develop an academic plan as part of the process and leave with a roadmap for completing a certificate or degree program in the healthcare industry.

### Potential Obstacles and the Panel's Advice

**OBSTACLE:** *Industry needs can change rapidly, making it challenging to maintain alignment between pathways curriculum and employer needs.*

**PANEL'S ADVICE:** Industry needs often change at a faster pace than community colleges are equipped to respond. This challenge is particularly acute in emerging industries where competencies, labor market demands, and external funding sources to support training for specific populations are in flux.<sup>29</sup>

To be responsive to changing industry needs, such as advances in technology, the expert panel recommends college administrators and staff should identify opportunities to remove barriers that prevent faculty from adapting their programs in a timely fashion, such as long program or curriculum approval processes or limited opportunities for deep engagement with employers and industry partners.

Establishing and maintaining strong, regular, and meaningful connections with employers is one of the most effective ways for community colleges to ensure their pathway programs remain relevant and responsive to industry needs.<sup>30</sup> Employers can be involved in frequent reviews of curriculum. They can also be asked to identify skills that are transferable to multiple career paths in the same industry, thereby affording students some flexibility in choosing occupations as they advance along a career pathway.

Active employer partner teams, such as advisory committees, can provide regular feedback channels between colleges and

industries to ensure all stakeholders are informed of changes or emerging needs within local or regional educational and employment contexts. Quarterly meetings that allow for the discussion of changes in industry needs and trends make it easier for colleges to incrementally modify small portions of their curriculum as needed.

See **Recommendation 5** for more information on how community colleges can develop and leverage partnerships with employers and industry leaders.

**OBSTACLE:** *Students encounter barriers to entry and progression along career pathways.*

**PANEL'S ADVICE:** Staff and faculty can ensure that students are able to enter and progress through pathways by identifying, monitoring, and addressing barriers that students encounter. Upon pathway entry, some students lack the math, reading, and/or writing skills required to successfully complete college-level work. Barriers related to career pathways entry also include narrow application windows, long waitlists, prerequisite requirements, and assessment burdens, and institutions lacking practices that are culturally responsive or responsive to the needs of adult learners with busy schedules and multiple responsibilities to juggle.

The panel recommends community colleges should develop program structures that ensure smooth transitions along career pathways. One way to do this is to design bridge programs, typically preparatory courses in basic skills, that provide core instruction to many related career pathways programs (latticing), which increases the number of options students have when they complete bridge programming. Instructors of such courses can also encourage students to progress along a career pathway by incorporating short introductory segments of occupational training in their curriculum, or by inviting CTE faculty to deliver introductory lectures to bridge students.<sup>31</sup>



Other deliberate strategies for helping students advance into career pathways upon completing basic skills courses include intensive advising<sup>32</sup> and financial incentives.<sup>33</sup> Students may also benefit from supports to help them prepare applications or study for pre-program assessments.

The expert panel believes community college staff should pay particular attention to transitions where students may experience challenges progressing to the next step on a pathway or when re-entering the pathway. These transition points may offer practical opportunities for building in new supports, such as additional advising or navigation services to connect students to relevant academic, non-academic, career, and financial supports (see **Recommendation 4**). Paying attention to the particular needs of diverse student populations, including language, income and other personal and familial circumstances, is important to enabling these students to make the transitions successfully. Active monitoring of student progress often may require enhanced institutional research capabilities, and community colleges are highly encouraged to make these commitments. At the same time, community colleges should approach their career pathways programming with an eye towards equity, so as to counter some of the barriers faced by underrepresented students.<sup>34</sup>

**OBSTACLE:** *Initial steps on some career pathways lead to low-wage jobs.*

**PANEL'S ADVICE:** Balancing the short- and long-term needs of both employers and students can be challenging for community colleges designing and implementing career pathways. Consistently involving employers and industry professionals in career pathways development is one way to routinely identify family-sustaining

employment opportunities in industries relevant to the college's postsecondary occupational offerings and align the college's program offerings accordingly.

The panel believes it is important for community college administrators and staff to have candid conversations with employers about wages prior to career pathways development. Will the resulting wages equal the effort put in by students pursuing the pathway? Will they be sufficient for students to repay college debt, if applicable? Will they sustain a living-wage job that leads to future promotions and increasingly higher pay along a career pathway? Community colleges should avoid contributing to the development and/or delivery of certain types of training that does not yield living-wage jobs, and also restrain from flooding the market with an oversupply of candidates for low-wage jobs.

When an initial step on a career pathway trains students for a low-wage job—such as Certified Nurse Assistant on a healthcare pathway—the expert panel suggests it is important for community colleges and employers to consider whether that initial job will prepare completers for a next step on the pathway, and whether that next step will lead to employment in a higher-skilled, better-paying job. It is also critical for college faculty and staff to make sure students are aware of the likely salary at each step along a career pathway. Including information about salaries when mapping career pathways is one way to remind colleges, employers, and students of the full range of opportunities along the pathway. As shown in **Figure 1.8**, it can be useful to map out the career pathway and the corresponding employment opportunities and wages associated with different levels of the pathway.

Figure 1.8. Sample career pathway map

## CAREER OPPORTUNITIES

### Architectural Engineering Design

Prepares students for employment in the field of residential design or a related technical field such as drawing for product manufacturers, engineering or design firms.

Prior graduates have entered engineering technician positions in computer aided drafting and design (CAD), project management assisting, residential design and site planning and developing, truss design, and performing structural calculations and computations for engineering of wood beams and joints. Students participate in realistic training activities as a part of their educational experience.

### STARTING CONSIDERATIONS

Apply to Clover Park Technical College

### STARTING OPTIONS

- Still in high school
- Dual credit courses
- Other students:
  - High School Diploma / Some College
  - GED, ESL, Adult Basic Skills (ABE), I-BEST
  - 1st Career / 2nd Career
  - Seeking Professional Credentials
  - Continuing Ed

### FOR MORE INFORMATION

Contact the Architectural Engineering Department

### ENTRY-LEVEL CERTIFICATE OPTION

- Architectural CAD Drafting
- I-Best Program for ESL/ABE (100% applicable to degree)
- 3-quarter program
- Dual Credit Articulation Agreements
- May transition from Trades Academy

### EMPLOYMENT AND WAGES

- Auto CAD Technician
- Drafter

### ARCHITECTURAL ENGINEERING DESIGN ASSOCIATE DEGREE

- AAT & AAS-T
- 6-quarter program
- Internships
- Dual Credit Articulation Agreements
- Day and Hybrid Classes

### EMPLOYMENT AND WAGES

- Civil Engineering Technician
- Architectural & Civil Drafter
- Cost Estimator
- Entrepreneurship Opportunities

### BACHELOR'S DEGREE

- Embry Riddle University - Technical Management Degree
- The Evergreen State College - Upside Down Degree
- Lake Washington Institute of Technology - Applied Design
- Check with the receiving 4-year institution for transfer of credit

### EMPLOYMENT AND WAGES

- Architect
- Entrepreneurship Opportunities

Source: <http://washingtoncareerpathway.org/c/published/1275/cptc-architectural-engineering.html>

## Recommendation 2: Deliver contextualized or integrated basic skills instruction to accelerate students' entry into and successful completion of career pathways.

Students entering career pathways have diverse educational and employment backgrounds as well as knowledge and skill levels, which may drive their learning preferences and needs. The evidence related to this recommendation suggests that administrators, faculty, and staff should strive to be responsive to the different instructional needs of the students to support their successful completion of career pathways. Integrated basic skills instruction allows students to start from their current skills levels and develop the foundation in math, reading, and writing (“basic skills”) they need to enter and pursue occupational coursework. For an example of integrated basic skills instruction, see the *Highlights from the Field* on page 24.

Students may benefit from contextualized instruction, which includes “instructional strategies designed to more seamlessly link the learning of foundational skills and academic or occupational content by focusing teaching and learning squarely on concrete applications in a specific context that is of interest to the student.”<sup>35</sup> **Figure 2.1** offers an example of how to design contextualized reading instruction by engaging with career and technical instructors, as well as employers and industry partners, in developing industry aligned learning goals and lessons plans.

### Figure 2.1. Example of contextualized reading instruction

Building on the skills identified by the CTE faculty, Ms. Franeta, the ESL Instructor, developed some learning objectives for the basic skills instruction as part of the Programa de Carpinteria Fina, a fine woodworking program at Laney College. For example, in the contextualized reading class, some of the learning goals developed include:

- » Apply previewing methods to reading technical texts.
- » Practice inferring and critical thinking skills in reading and writing technical material.
- » Recognize and use correctly vocabulary of the trades.
- » Analyze and practice English word building.
- » Describe and report work situations or conditions in technical language.

During the program development stage, Ms. Franeta, sought authentic materials to use in contextualizing her English course and the other academic courses. The career and technical instructors helped her to identify several resources: articles in Fine Woodworking magazine, textbooks, and even specialized websites such as the Architectural Woodwork Institute (<http://awinet.org/>). These instructors also explained what they do in class and offered advice on how the basic skills instructors could support the technical classes.

Several employers and industry specialists also volunteered advice about the priority skills that it would be helpful for students to learn in addition to the woodworking skills. They provided input on job expectations and related skills (e.g., calculating skills and strong customer service).

Working with the CTE faculty, Ms. Franeta identified eight units around some common skills themes, such as organizing details in the reading. She then worked collaboratively with the CTE faculty to develop lesson plans for these units that incorporated the career-focused content. Once each of the lesson plan units was complete, she also developed a syllabus for, in this case, the reading course. A similar process was followed for the other courses.

Source: <https://tcall.tamu.edu/docs/ContextualizingAdultEdInstructionCareerPathways.pdf>

## Recommendation 2

Students may be more likely to engage with basic skills instructional materials that draw upon occupational subject matter that interests them. Thus, contextualization can make basic skills training more relevant to students, improve student motivation, and promote transfer and application of newly acquired skills. When most effective, contextualized or integrated basic skills instruction provides accelerated on-ramps to career pathways by closing skill gaps and allowing students to see how basic skills will apply in future occupational training and employment.

Contextualization can take two forms:<sup>36</sup>

- **Contextualized basic skills instruction** broadly refers to instructional strategies that make explicit connections between learning of basic skills and occupational content. Examples of contextualized instruction include using examples from nursing (medicine dosage) as part of teaching basic math skills or using excerpts of textbooks from occupational areas when teaching reading comprehension. Contextualization is primarily woven into the assignments and examples used to teach basic skills.
- **Integrated basic skills instruction** refers to the strategy where basic skills instruction and occupational content instruction are delivered at the same time, often by a team of instructors,

one basic skills and one postsecondary occupational. Incorporating basic skills into postsecondary occupational instruction helps students to accelerate their progress along a career pathway because they can begin taking occupational coursework at entry.

Delivering contextualized or integrated basic skills instruction can involve considerable effort on the part of instructors. Development of contextualized curriculum and course materials, as well as alignment of teaching roles and instruction styles, requires time and resources. Successful contextualization of basic skills requires the commitment of administrators to provide opportunities and resources for instructors to develop and deliver a contextualized or integrated basic skills curriculum. Community colleges can consider partnering with local community-based organizations and offer adult education programs to help deliver the contextualized or integrated basic skills instruction.

WWC staff and the expert panel assigned a *moderate* level of evidence to Recommendation 2, based on nine studies of interventions that include contextualized or integrated basic skills instruction. Seven of the studies<sup>37</sup> meet WWC group design standards without reservations, and the other two studies<sup>38</sup> meet WWC group design standards with reservations.

**Table 4. Results of Meta-analysis for Recommendation 2**

Outcome Domain	Statistically significant and positive	Indeterminate	Statistically significant and negative
Credit accumulation	●		
Postsecondary degree attainment			●
Industry-recognized credential attainment	●		
Note: Across the nine studies, there were findings in three outcome domains even though all five educational outcome domains (see Box 1) were relevant for this recommendation. None of the nine studies included findings that meet WWC standards in the following outcome domains: (1) academic performance; or (2) technical skill proficiency.			

In nine of the 10 studies used to support Recommendation 2, contextualized or integrated basic skills instruction is a major or secondary component of the tested intervention. See [Appendix C](#) for a detailed rationale for the level of evidence assignment for Recommendation 2.

and delivering contextualized or integrated basic skills instruction. All figures and mentions of specific community colleges in Recommendation 2 are offered as examples only and should not be read as endorsements of specific products or approaches.

This section describes strategies, examples, and tools that can support community college administrators, faculty, and staff in designing

### *Highlights from the Field*



#### **Integrated Basic Education and Skills Training**

Developed by the Washington State Board for Community and Technical Colleges (SBCTC), Washington State's Integrated Basic Education and Skills Training (I-BEST) program is a nationally known program that aims to increase access to and completion of college-level occupational training in a variety of in-demand occupational areas.

Delivered within a structured career pathway, the SBCTC designed I-BEST to provide the first step on an articulated career pathway in a range of occupations, particularly to students who need additional basic skills instruction to access and succeed in occupational training.

The signature feature of I-BEST is team teaching by a basic skills instructor and an occupational instructor during at least 50 percent of occupational training class time. SBCTC required team teaching, but allowed flexibility in how instructors approached their teaching, including how they defined their roles within the classroom, planned their time together, and established the rapport to work collaboratively.

In addition to team teaching of basic skills and occupational training, I-BEST programs can also provide separate non-credit basic skills courses designed to complement the occupational courses. In these support courses, the basic skills instructors review occupational material with the students, help them with their homework, and help them prepare for tests and quizzes.

*(Glosser et al., 2018)*



### How to Carry Out the Recommendation

The guidance below is informed by the studies that support the recommendation as well as the expert panel's knowledge of strategies and resources available to help implement the recommendation.

- 1. Assess CTE instructional materials to identify the math, literacy, and writing skills students need to successfully progress along career pathways, assess students to determine their skill levels, and identify opportunities to contextualize instruction.**

Reviewing course textbooks, assignments, and other materials from courses offered at various points along a career pathway is one way to determine the skills students need in order to be successful and master the occupational content in a course. When conducting this review, the expert panel suggests instructors should review course materials to ensure the content is appropriately aligned to the basic skill levels of incoming students and identify opportunities to teach or reinforce basic skills using examples and concepts that are relevant to occupations along the pathway. There are several resources freely available to help instructors plan and implement contextual teaching and learning approaches.<sup>39</sup>

Community college faculty and staff can better design instructional supports for students if they know the levels of skills required to understand the course content as well as the skills levels of their incoming students. Data from intake assessments of basic skills proficiency can inform what types of skills instruction students need, as well as how much instruction they need to help them better understand course content.<sup>40</sup> Students

re-entering pathways after being out of school for an extended period of time may also benefit from additional supports related to study skills and time management.<sup>41</sup>

As students progress through career pathways instruction, ongoing assessments—both formal and informal—may help faculty and staff identify opportunities to provide additional instructional supports. For example, in response to emergent student needs, one career pathways program added a supplemental instructor to lead review sessions and offered group and one-on-one training.<sup>42</sup> Instructor-led study groups and College Readiness classes, which included modules on basic reading, writing, and math skills and covered college and career success topics, such as time management, test taking, and understanding how to learn, are examples of another community college's multi-pronged response to emergent student needs.<sup>43</sup>

- 2. Determine strategies for teaching basic skills that are appropriate for the student population served and the resources available.**

Two common strategies are (1) pre-pathway bridge programs that offer contextualized basic skills curricula, for example, teaching math by calculating dosages in ways that are relevant to careers along the pathway<sup>44</sup> and (2) integrated instruction, where students begin an occupational training course on a pathway, but are team taught by an occupational instructor and a basic skills instructor.<sup>45</sup> Bridge programs are offered just before or as the first step of a career pathway and can be designed to help students master basic skills needed to support their transition into pathway courses, especially when contextualization helps them see direct connections and applications of those skills in the occupations they are pursuing. Integrated

instruction, on the other hand, embeds basic skills instruction into the technical content and is applied at each pathway step. Both strategies can provide students the basic skills needed to succeed along career pathways, but their design and implementation vary greatly.

When selecting the best strategy for providing basic skills instruction, community college administrators will need to consider the time and resources that would be required of staff and instructors implementing the selected strategy. Bridge programs can be offered on campus or at off-site locations run by community-based organizations, but initial and ongoing planning or coordination between basic skills instructors and occupational instructors is required to ensure the basic skills instruction is relevant to the occupational content that will be covered in subsequent courses.

Curriculum specialists can help identify topics that can be contextualized in a basic skills class and support instructors to help them learn the content. They can also emphasize the importance of contextualized instruction and provide supports to instructors to ensure uniformity and consistency across courses within a pathway.<sup>46</sup>

### **3. If implementing a team teaching model for courses with integrated instruction, select a model that best fits your institution and faculty.**

Community colleges should consider various team teaching models to ensure the one they select is most appropriate and feasible for the college and its faculty. Options for team teaching may range from monitoring, where one teacher is responsible for instruction while the other circulates around the classroom monitoring students' needs, to shared teaching duties, where the occupational instructor and basic skills instructor each focus on their own area of expertise.<sup>47</sup> Considerations for selecting a

specific model include instructional needs of students, abilities of instructors, and how adaptable the subject area is for team teaching.

The evaluation of Washington State's Integrated Basic Education and Skills Training (I-BEST) program identified three different approaches to team teaching that community colleges could consider adapting to their local context: (1) basic skills instructor participates as an active student; (2) basic skills instructor delivers part of the content during a designated part of each occupational class; and (3) basic skills and occupational instructors jointly deliver class content ("co-teaching").<sup>48</sup> These three approaches are described in **Figure 2.2**.

### **4. Provide professional development and collaborative planning time to support team teaching.**

Devoting time and resources to professional development for both occupational instructors and basic skills instructors may help ensure they are adequately prepared for their team teaching assignments.<sup>49</sup> The evaluation of I-BEST, implemented at over 30 community and technical colleges across Washington State, reported on the learning curve several faculty experienced when they were newly assigned to team teach, noting "for many occupational instructors, I-BEST courses were their first experience teaching low-skilled students, whereas basic skills instructors needed to learn occupational content quickly."<sup>50</sup>

Adequate, ongoing planning time for faculty to coordinate their teaching styles and the instructional content can promote more successful team teaching. The expert panel believes occupational instructors can learn pedagogical approaches from basic skills instructors; conversely, basic skills instructors can ensure basic skills are applied in more meaningful ways when they understand the

**Figure 2.2. Sample team teaching models**

### **Observation of Basic Skills Instructor Participating as an Active Student**

The second course in a two-quarter introductory machining sequence was a math-intensive course that emphasized “shop essentials.” The objective of the course was to familiarize students with measurement tools that they would be using in the shop. The class was primarily lecture based and led by the occupational instructor. The instructor explained the use of different tools and parts, the application of geometry concepts to the machining tools, and demonstrated measurement techniques using the tools.

The basic skills instructor frequently summarized and reiterated key points and clarified concepts that seemed to confuse students. The basic skills instructor regularly posed questions to the occupational instructor for further clarification, such as differences in certain cutting techniques and when certain techniques should be used. This resulted in regular dialogue between instructors.

Both instructors responded to student questions, answering depending on their expertise. When answering questions, the basic skills instructor focused primarily on math concepts and terminology, whereas the occupational instructor described tools and measurement strategies with some reference to math concepts.

### **Observation of Basic Skills Instructor Delivering Content During an Occupational Class**

Office Procedures was a required course in the Clerical Assistant sequence. It focused on business English, time and resource management, telecommunications knowledge and phone etiquette, organizational skills, basic financial tasks, administrative skills, oral presentations, business terminology, and conflict resolution in an office setting.

Roughly half the observed class was an interactive large group discussion, with the remainder evenly split among lecture, independent work, and small group work. The lecture component began with the basic skills instructor giving a brief presentation on test-taking strategies. This was followed by a seminar-style discussion led by the occupational instructor. Students had the option to work independently or with a partner on a worksheet activity about time management, followed by group work in which small groups of students were tasked with developing strategies for effective time management given scenarios that were assigned by the instructor. The two instructors were purposeful in drawing out students’ personal experiences and attempting to make them relevant to the course content.

The occupational instructor delivered most of the content, and the basic skills instructor offered additional clarification or examples. The two instructors traded off in assisting students or calling on students to speak during activities. The content was not overly technical, so the occupational and basic skills instructors both spoke about general success strategies, skills, and concepts.

### **Observation of Basic Skills Instructor and Occupational Instructor Co-teaching**

The Sustainable Office Skills class was structured around the creation of a portfolio for each individual student. It included both independent and small group work, as well as some interactive content often based on assigned readings.

For the group work, instructors spent a substantial amount of time orienting students to the task and explaining the goal of the project. Students worked in pairs or groups of three to develop a sample question to ask an employer to improve sustainability in the workplace, such as “Have you considered using a recycling bin?”. After working in groups, the instructors ask students to share their ideas, and the basic skills instructor defined terms that English language learners may have found difficult to understand. Students worked independently to write individual 30-second elevator speeches about themselves in preparation for job interviews. The occupational skills and basic skills instructors also role-played as job candidate and potential employer, demonstrating interview and job readiness skills.

Instructors were highly integrated in delivering content, with limited differentiation of the basic skills and occupational instructor roles. The two instructors interacted constantly throughout the class, with both clarifying concepts and delivering instructions on activities and assignment expectations. The basic skills instructor asked clarifying questions both to students and to the other instructor, provided feedback to student responses, and explained classroom tasks.

Source: Glosser et al. (2018)

contexts in which those skills need to be applied. Further, instructors across several sites of the Accelerating Connections to Employment (ACE) program, designed to improve employment outcomes for low-skilled workers through formal partnerships between WIBs and community colleges, reported planning and implementing a co-teaching model allowed them to identify students' problems faster, such as learning disabilities or difficulty understanding certain concepts, and then work one-on-one to address them.<sup>51</sup> ACE was implemented at nine sites across Maryland, Texas, Connecticut, and Georgia.

### 5. Assess whether basic skills instruction (contextualized or integrated) is delivered in a manner that is resulting in students achieving their learning goals.

Program directors can use a number of approaches to assess the delivery of contextualized basic skills instruction in bridge programs or integrated courses offered on campus. For example, they can observe classroom instruction, conduct interviews with faculty or program staff, or collect feedback from students through surveys or focus groups.<sup>52</sup>

Administrators can use administrative data to assess whether the delivery of contextualized basic skills instruction is increasing the progression rate of students in a pathway. For example, administrators and staff can determine how many students successfully transitioned from a pre-pathway bridge program to pathway courses. Administrators and staff can periodically consult instructors to make sure students are acquiring the skills necessary to be successful in their occupational courses and able to progress along the pathway. If not, they may consider incorporating additional basic skills preparation into courses, and might also add additional academic supports for students still demonstrating skills gaps<sup>53</sup> (see **Recommendation 4**).

At transition points along a career pathway, summative assessments can be used to make sure students have mastered the basic skills necessary to be successful in the next occupation or training program along the pathway. Where applicable, these assessments should align with college admission tests to ensure students can earn scores that help them avoid being placed into developmental coursework.

## Potential Obstacles and the Panel's Advice

**OBSTACLE:** *Developing materials for contextualized basic skills instruction can be time intensive.*

**PANEL'S ADVICE:** Instructors in both individual teaching and team teaching scenarios may face challenges developing materials for contextualized basic skills instruction. Instructors who are part-time or are otherwise overbooked may have insufficient time to adapt course content to support contextualized instruction, assignments, and assessments. Or the team may have misaligned schedules, making it difficult for them to engage in joint planning. The panel believes administrators should consider providing release time or other incentives to faculty to allow them to jointly develop instructional materials or coordinate team teaching opportunities.

Instructors may be able to save time by seeking out existing resources that can be adapted to their local courses and context. There are several online repositories of open educational resources, such as SkillsCommons (see **Figure 2.3**), that faculty and staff can use to identify relevant resources and information for course development. The materials are tailored to specific industries and occupations. If resources permit, curriculum specialists can provide tips for reviewing and selecting such materials. Finally, local employers and industry partners may be willing to share non-proprietary materials that can double as course materials.



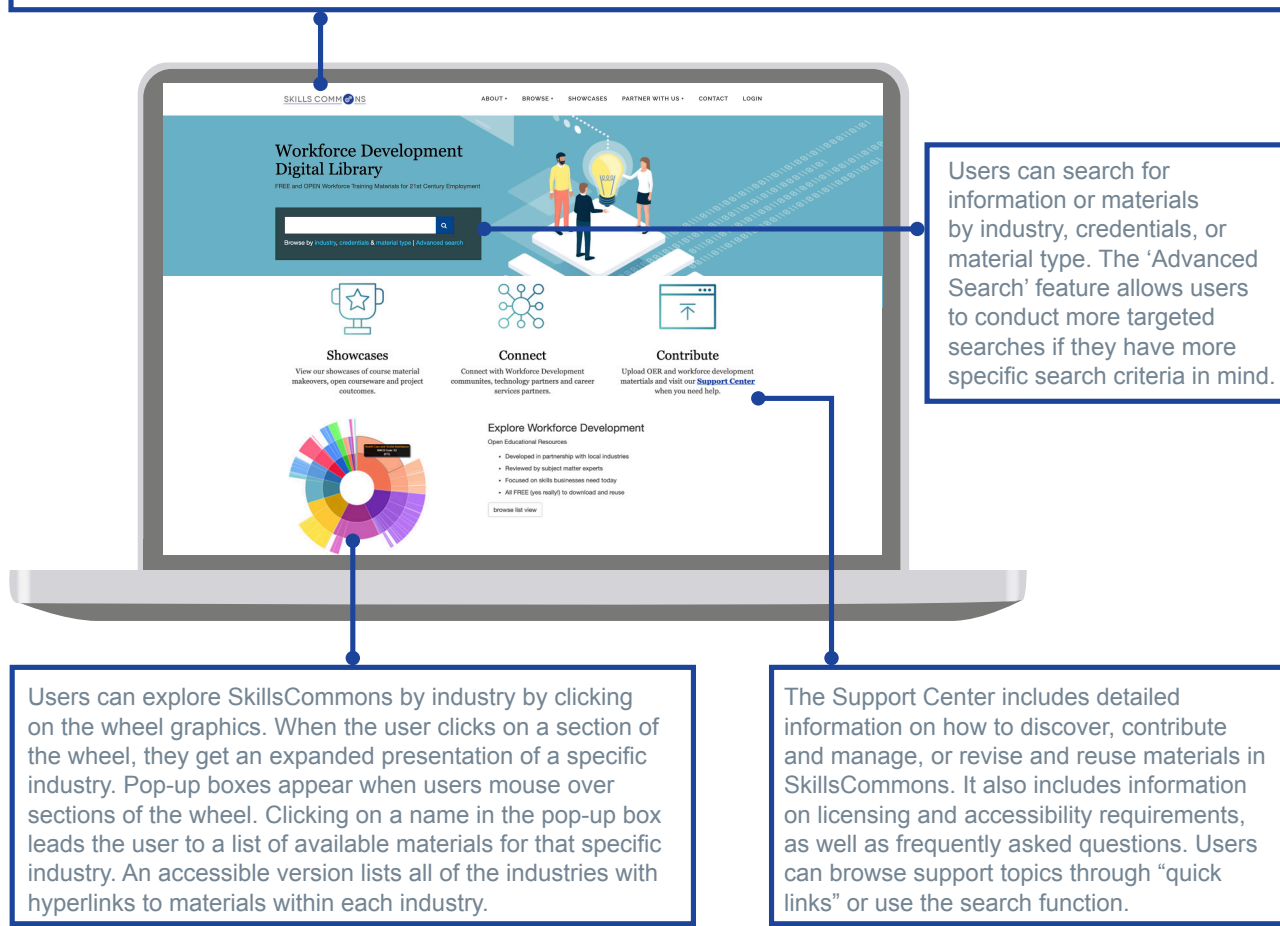
**OBSTACLE:** Team teaching can be more costly.

**PANEL'S ADVICE:** Team teaching can be resource intensive, and it does not always fit neatly into faculty workloads or contracts. The expert panel suggests community colleges committed to increasing retention and progression rates for students participating in career pathways should look across their networks for examples of other colleges that have found the funds and workload flexibility required to support

team teaching. Braided funding approaches may also help community colleges support team teaching.<sup>54</sup> Community colleges unable to afford team teaching should consider how to support contextualization in a single course taught by one instructor by providing that instructor with appropriate professional development or with course planning/coordination between occupational and basic skills instructors.

**Figure 2.3. SkillsCommons**

The U.S. Department of Labor's Trade Adjustment Assistance Community College and Career Training (TAACCCT) program created a free and open online library called SkillsCommons containing free and open learning materials and program support materials for job-driven workforce development. The \$1.9 billion investment by the U.S. Department of Labor produced a comprehensive collection of workforce-related Open Educational Resources (OER) created by over 700 community colleges across the nation. The OER can be found, reused, revised, retained, redistributed, and remixed by an individual, institution, and industry for FREE with the proper attribution to the original author of the resources.



Source: <http://www.skillscommons.org/>



## Recommendation 3: Offer flexible instructional delivery schedules and models to improve credit accumulation and completion of non-degree credentials along career pathways.

Students must balance their education and training with jobs, families, and other obligations. Often, that can make traditional course formats and schedules problematic. Flexible delivery of instruction, through non-traditional course times and/or online or self-paced courses, can help students combine college with other commitments to access, and progress along, career pathways.

Flexible course scheduling includes offering evening or weekend courses or multiple sections of a course across a range of days, times, and locations. Block scheduling can be used to coordinate or group courses in ways that consolidate the amount of time students need to spend on campus.

Technology can be used to vary, blend, or accelerate course formats to accommodate students who prefer online or hybrid learning formats or who might benefit from self-paced learning modules.<sup>55</sup>

Awarding credit for prior learning, offering co-requisite courses, and/or offering competency-based courses, programs, and assessments can accelerate or compress students' time to earning credentials. When carefully designed, these approaches can also help to ensure that students acquire—and demonstrate mastery of—both technical and basic skills as they progress along a career pathway.

WWC staff and the expert panel assigned a *minimal* level of evidence to Recommendation 3, based on six studies of interventions that include flexible instructional delivery models. Five of the studies<sup>56</sup> meet WWC group design standards without reservations, and the other study<sup>57</sup> meets WWC group design standards with reservations. An additional three studies<sup>58</sup> include flexible instructional delivery models but do not report any educational outcomes.

**Table 5. Results of Meta-analysis for Recommendation 3**

Outcome Domain	Statistically significant and positive	Indeterminate	Statistically significant and negative
Credit accumulation		●	
Postsecondary degree attainment	●		
Industry-recognized credential attainment	●		
Academic performance		●	
Technical skill proficiency		●	

Note: Across the six studies, there were findings in all five educational outcome domains (see Box 1).

In all seven of the studies used to support Recommendation 3, flexible instructional delivery models are a secondary component of the tested intervention. See [Appendix C](#) for a detailed rationale for the level of evidence assignment for Recommendation 3.

This section describes strategies, examples, and tools that can support community college administrators, faculty, and staff in offering flexible instructional delivery and course acceleration. All figures and mentions of specific community colleges in Recommendation 3 are offered as examples only and should not be read as endorsements of specific products or approaches.

### How to Carry Out the Recommendation

The guidance below is informed by the studies that support the recommendation as well as the expert panel's knowledge of strategies and resources available to help implement the recommendation.

#### 1. Assess the institutional readiness and resources needed to offer flexible scheduling and/or instructional delivery models.

Setting up flexible scheduling and course offerings in multiple formats requires coordination and logistics. For example, academic calendars and schedules may need to be modified to accommodate flexible course scheduling. Designing innovative instructional delivery models requires similar levels of coordination as well as resources for instructional technology and professional development for the instructors who will use the technology.

Institutional capacity assessments can help community colleges think about which things they need to work on first when designing more flexible course schedules and models. Faculty willingness and readiness to teach courses on nights and weekends, as well

as resources and capacity to develop and deliver materials for alternative course formats, should be part of the assessment. Instructional designers and faculty may need to review information technology platforms to determine the extent to which they can support online or hybrid courses.

#### 2. Tailor flexible course schedules and instructional models to diverse student needs and instructional preferences.

Students have different capabilities, needs, barriers, and learning preferences that influence their ability to engage, to be retained, and to be successful along a career pathway. Community colleges can use various strategies to maximize flexible scheduling, such as block scheduling, evening and weekend course offerings, and self-paced online modules.<sup>59</sup> These should be carefully aligned with, and respond to, the diverse needs of students.

Block scheduling reduces time required on campus,<sup>60</sup> whereas evening courses can accommodate students who are employed.<sup>61</sup> The New Visions Self-Sufficiency and Lifelong Learning Project found it necessary to offer basic skills instruction in three-hour time blocks that repeated three times daily to meet students' varying work, childcare, and transportation needs.<sup>62</sup> The program, which targets TANF recipients, was provided by a partnership between Riverside County Department of Public Social Services and Riverside Community College, which serves over 30,000 students in Riverside, California.

Self-paced online modules can help students address basic skills gaps while starting or preparing to start occupational courses.<sup>63</sup> Flipped classroom models use technology to help students learn new content outside of class and then use class time to reinforce the concepts and explore them in more depth with their instructors and peers.<sup>64</sup>

### 3. Provide training and support to instructors developing flexible instructional delivery models.

Developing hybrid, online, and flipped classroom formats requires skill sets that extend beyond those used in developing more traditional courses. Faculty designing and delivering flexible instructional models for career pathways must learn to leverage instructional technology while remaining attentive to student engagement strategies.<sup>65</sup> They must also ensure course learning objectives, instruction, and assessment align to industry needs, as identified during the creation and implementation of the career pathways (see [Recommendation 1](#)).

Successful design and delivery of alternate course formats may require additional funding for instructional technology, as well as time and resources for instructors to collaborate with instructional designers to ensure their new hybrid or online courses are effective. To ensure they will be successful, the expert panel believes administrators need to allocate sufficient resources to course scheduling and design efforts. Perkins V provides funds colleges can access for new professional development programs for instructional staff.

Faculty may seek advice from peers through their professional networks or online repositories of open educational resources, such as SkillsCommons or MERLOT. These repositories include development tools, online course materials and modules, syllabi, and materials for hybrid courses, to name a few. As resources permit, instructional designers can be paired with faculty developing and delivering alternative course formats.<sup>66</sup> Faculty may consult EDUCAUSE's "7 things you should know about" series, which offers a collection of concise briefs that summarize emerging technologies and practices and answer seven questions to help instructors understand whether and how to

adopt them. The briefs on *Open Education Content*, *Collaborative Learning Spaces*, *Video Communication*, and *Assessing Online Team-Based Learning* might interest faculty exploring flexible instructional delivery models and communication and collaboration tools to adopt in their courses.<sup>67</sup> The EDUCAUSE library also includes a collection of resources organized by topics such as *Online Course Development Planning* and *Online Teaching Strategies*.<sup>68</sup> Faculty will need the support of administrators and institutional support staff in order to be successful in designing and delivering flexible instruction.

### 4. Use acceleration strategies, such as prior learning assessments and competency-based education, to reduce the time between students' pathway entry and their attainment of non-degree credentials.

Acceleration strategies can be applied to structural as well as instructional aspects of career pathways. These acceleration strategies include offering contextualized or integrated basic skills training (see [Recommendation 2](#)), awarding credit for prior learning, or engaging students in a competency-based education (CBE) model. Students entering pathways with skills gaps may benefit from a variety of approaches to accelerating any necessary basic skills instruction. As just one example, Madison Area Technical College, a college with many years of experience designing and implementing bridge programs, created sectoral bridge programs to package and compress basic skills and occupational training to prepare students for a specific occupational field. The goal was to accelerate the students' entry into the college's healthcare diploma and degree programs by shortening basic skills training to one semester.<sup>69</sup> Colleges can also partner with other organizations to offer brief preparatory courses to help students test out of remedial courses.<sup>70</sup>

Prior learning assessments (PLAs), one mechanism for awarding credit for prior learning, help students move from the non-credit- to the credit-bearing parts of a career pathway.<sup>71</sup> For example, the Northeast Resiliency Consortium, a collaboration of community colleges, industry groups, and workforce agencies, leveraged a consortium-wide focus on PLA to develop regional PLA standards that included both internal and external PLA options (see **Figure 3.1**), and that led several colleges to modify and formally approve their institutional PLA policies.

**Figure 3.1. Strategy for developing regional prior learning assessment (PLA) standards**

The Northeast Resiliency Consortium (NRC) developed regional prior learning assessment (PLA) standards that its colleges assessed against their existing policies and processes. Regional PLA standards were developed through an iterative process among the NRC consortium leads, college faculty and staff, and national experts. These PLA standards are intended to expand opportunities for students to receive credit for prior learning.

At several colleges, these regional PLA standards went under review by college leaders and administrators, and most colleges are confident that the standards will align with their existing standards or will be approved as new standards for the college. Some colleges expressed concern about institutional barriers, for example faculty resistance or limited institutional resources, to moving forward with the regional PLA standards. In general, however, colleges are adapting and aligning the regional PLA standards within their unique institutional contexts.

As part of the implementation of PLA standards, colleges worked with nationally recognized experts and received on-campus training for faculty and staff. These sessions were often also attended by faculty and staff not directly working on their college's NRC grant.

Source: Price et al. (2017)

Another acceleration strategy is Competency-Based Education (CBE). CBE is a curriculum design in which students acquire and demonstrate their knowledge and skills by engaging in learning exercises and activities that target clearly defined competencies. Credentialing is based on mastery of targeted competencies, rather than on seat-time, clock-hours, and face-to-face instruction. In this way, CBE allows students the opportunity to progress through their coursework in an accelerated manner.

Salt Lake Community College, a large two-year college serving over 60,000 diverse students across ten campuses, applied TAACCCT grant resources toward incorporating both CBE and PLAs to make its curriculum “more open to the larger environment and successful in transitioning students into employment and further education.”<sup>72</sup> A key purpose of converting curriculum to a CBE model was to reduce time-to-degree, reduce cost of attendance, and emphasize self-paced and self-directed learning that would motivate students to complete credentials. Administrators developed CBE support materials for faculty, including training, a handbook, and new policies and procedures. Community colleges interested in offering CBE may wish to consult the Competency-Based Education Network, especially its *Quality Framework for CBE Programs* and the accompanying *Quality Framework User's Guide*.<sup>73</sup>

### Highlights from the Field



#### Competency-Based Education

Through a TAACCCT grant, Salt Lake Community College's School of Applied Technology and Technical Studies converted 20 high priority programs of study (POS) to competency-based education (CBE) with the goal of credentialing students upon their mastery of competencies and completion of POS, and of placing less emphasis on seat-time, clock-hours, and face-to-face instruction.

The college's CBE model used a hybrid delivery approach, incorporating self-paced, online learning modules, and hands-on labs and competency-based assessment. Another important aspect of the project was to enhance Recognition for Prior Learning (PLA), allowing students to progress through their POS in an accelerated manner.

The process of converting POSs to CBE required collaboration between faculty, administration, and instructional designers in the college's Online & eLearning Services Division. Faculty could consult with the Instructional Design unit that employed professionals trained in instructional technology, CBE-instructional design, and assessment to convert applicable portions of their curriculum into the CBE format. The conversion also involved ongoing consultation through Program Advisory Committees, drew upon the experience of an expert in PLA, and provided professional development for faculty and staff.

(Bragg et al., 2018)

#### 5. Continuously monitor and respond to students' needs regarding flexible course offerings and delivery modes.

Administrators, instructors, and staff in career pathways should continually assess whether students are able to access the courses they need to make progress toward credit accumulation and credential attainment. This includes ensuring required courses are offered frequently, and at varied times. Community colleges must also consider whether students have the necessary hardware and internet connectivity to connect to and participate in courses that require remote lectures, labs, or other activities. The expert panel that authored the *Using Technology to Support Postsecondary Student Learning Practice Guide* suggested "instructors, department heads, and administrators share responsibility in monitoring and evaluating the effectiveness of the course formats and delivery modes

used to engage and teach learners."<sup>74</sup>

Many Learning Management Systems now incorporate surveys that continuously monitor students' progress and challenges, including scheduling and student attendance problems. These types of student data may indicate unmet needs that could be addressed.

As needed, community colleges may use data on student progress and outcomes to inform adjustments to when, how frequently, and in what format courses are offered.<sup>75</sup>

Academic program reviews, which involve a comprehensive analysis of program quality and are required for accreditation, provide an opportunity to examine a wide variety of data about a program. These data include historical enrollment patterns, external demand, program cost analysis, program outcomes, and feedback on areas for continuous improvement.



### Potential Obstacles and the Panel's Advice

**OBSTACLE:** *Flexible instructional delivery schedules and models demand high levels of institutional flexibility and ongoing coordination among instructors and administrators.*

**PANEL'S ADVICE:** The design and implementation of effective instructional delivery schedules and models that are flexible require commitment and time of instructors. However, the expert panel cautions the work of the instructors will not be enough if they do not also have support from administrators, support staff, and institutional infrastructure in place. Specifically, the panel notes the need for administrators to include resources in their budgets to explicitly support the design and implementation of flexible delivery models and schedules, especially through professional development and an investment in technologies to support flexible delivery models.

Alternate instructional delivery approaches, such as hybrid, online, or mobile courses, will likely require instructors to change the way they design and teach their courses. When administrators emphasize the importance of—and commit to supporting—flexible instructional delivery schedules and models, they can set the

expectation that instructors and staff must work together to design and deliver instruction that best meets the diverse needs of their students. Data on student needs and outcomes might help in making the case to faculty for alternative course schedules and formats, but should also be used to understand patterns in student performance and to identify students who need additional supports—whether instructional or technological—to succeed in classes that are not taught in-person.

**OBSTACLE:** *Some courses may not lend themselves well to online formats.*

**PANEL'S ADVICE:** Though courses in some content areas may require a lot of hands-on training, such as welding, manufacturing, and nursing, some aspects of these courses may still be compatible and even enhanced by an online learning environment or the use of high-fidelity physical models. For example, health care training may use sophisticated life-like mannequins in realistic patient environments to create structured scenarios requiring specific and essential actions that are predictable and reproducible for all students in a course, which can reduce the amount of time students must spend in clinical experiences, thereby offering more students the opportunity to engage in these experiences.<sup>76</sup>

## Recommendation 4: Provide coordinated comprehensive student supports to improve credit accumulation and completion of non-degree credentials along career pathways.

Students often need to navigate a variety of academic and non-academic challenges that can affect their ability to complete coursework and progress toward earning a credential. These challenges include choosing the right program of study and career, balancing education with family and work obligations, and covering tuition costs and related educational expenses. Providing comprehensive student supports in a coordinated fashion helps students to be resilient to these challenges.

The evidence suggests and the expert panel believes colleges should provide a broad range of academic and non-academic, career, and financial support services. These may include proactive academic advising, mentoring, coaching, counseling, career navigation, and financial aid, as well as referral to other support services. The panel recognizes most community colleges currently offer students many of the supports featured in the studies that informed this Practice Guide. The panel believes these student supports should be delivered both one-on-one and in small group settings, and that the supports should be more intentionally integrated into the student experience so they

are unavoidable as students progress along their career pathway—from intake to completion.

To help ensure that student supports are readily available, delivered just in time, and easy to access, consider assigning faculty and staff with clearly defined roles and lines of communication. The panel believes that greater level of coordination could help avoid gaps and overlaps in providing these supports.

When program faculty and staff are attentive to students' emergent needs, it may allow them to be more responsive in offering tailored supports that will keep students on the path to successfully completing their studies.

Providing comprehensive student supports can be costly. Both internal and external partnerships can be leveraged to provide and enhance student support services. Braided funding, using multiple funding sources to cover the costs of student support services, is one strategy for covering the costs of the supports provided.<sup>77</sup>

WWC staff and the expert panel assigned a *moderate* level of evidence to Recommendation 4, based on 15 studies of interventions that include comprehensive student supports.

**Table 6. Results of Meta-analysis for Recommendation 4**

Outcome Domain	Statistically significant and positive	Indeterminate	Statistically significant and negative
Credit accumulation	●		
Postsecondary degree attainment			●
Industry-recognized credential attainment	●		
Note: Across the 15 studies, there were findings in three outcome domains even though all five educational outcome domains were (see Box 1) relevant for this recommendation. None of the nine studies included findings that meet WWC standards in the following outcome domains: (1) academic performance; or (2) technical skill proficiency.			

Twelve of the studies<sup>78</sup> meet WWC group design standards without reservations, and the other three studies<sup>79</sup> meet WWC group design standards with reservations. An additional study<sup>80</sup> includes comprehensive student supports but does not report any educational outcomes.

In 14 of the 15 studies used to support Recommendation 4, comprehensive student supports are a major component of the tested intervention. See **Appendix C** for a detailed rationale for the level of evidence assignment for Recommendation 4.

This section describes strategies, examples, and tools that can support community college administrators, faculty, and staff in offering comprehensive student supports. All figures and mentions of specific community colleges in Recommendation 4 are offered as examples only and should not be read as endorsements of specific products or approaches.

### How to Carry Out the Recommendation

The guidance below is informed by the studies that support the recommendation as well as the expert panel's knowledge of strategies and resources available to help implement the recommendation.

- 1. Conduct an inventory of available supports and clearly define which college departments are responsible for delivering specific supports.**

Student support services may be provided by a large network of professionals, including those within a community college and those in the surrounding community. For this reason, the expert panel suggests it is important to conduct an organizational

### Highlights from the Field

#### Comprehensive Student Supports

Project QUEST, developed and implemented by Communities Organized for Public Service and Metro Alliance, provides comprehensive support and resources to help students complete occupational training programs at local community colleges and professional training institutes, pass certification exams, and obtain jobs in targeted industries.

The support services include:

- financial assistance to cover tuition and fees for classes, books, transportation, uniforms, licensing exams, and tutoring;
- remedial instruction in math and reading to help individuals pass college placement tests;
- counseling to address personal and academic concerns and provide motivation and emotional support;
- referrals to outside agencies for assistance with utility bills, childcare, food, and other services, as well as direct financial assistance with other supports on an as-needed basis;
- weekly meetings that focus on life skills, including time management, study skills, critical thinking, and conflict resolution; and
- job placement assistance, including help with writing resumes and interviewing, as well as referrals to employers that are hiring.

Project QUEST career counselors work with participants from the time they are accepted into the program until they obtain a job. Students are required to attend weekly meetings and submit class attendance sheets signed by instructors in order to continue receiving support. Another important aspect of the QUEST model is that it targets well-paying occupations in strong sectors of the local economy and employs staff dedicated to developing relationships with employers and to providing participants with assistance in obtaining a job.

*(Roder & Elliott, 2018)*

review of the services offered and clearly define who is responsible for them.

A resource mapping exercise can be an important first step toward identifying the student supports that are currently in place as well as service gaps, as they relate to projected student needs.

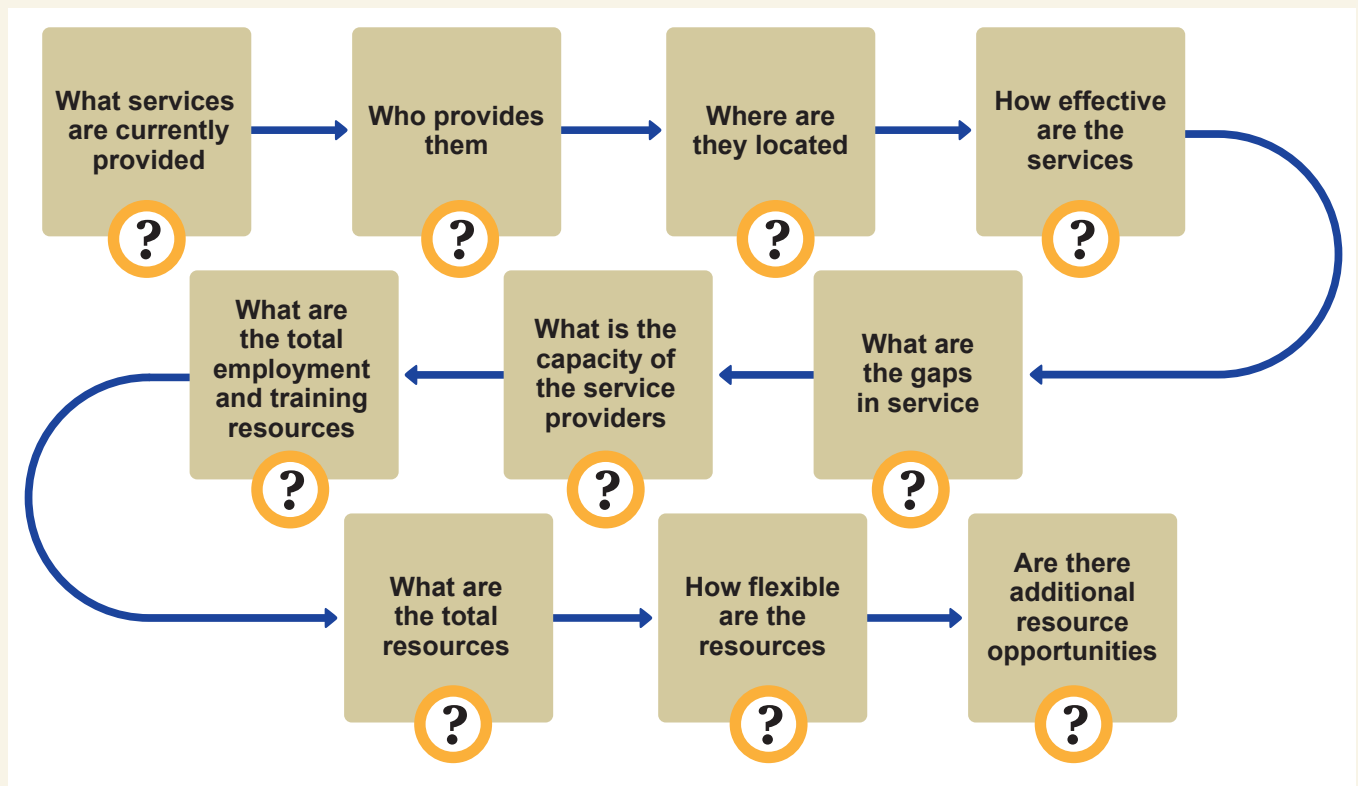
The resource map may cover the following types of student supports:

- **Academic supports** such as academic advising, tutoring, textbook lending, additional study sessions, and instructional support in math/writing, among others.
- **Non-academic (personal) supports** such as assistance with life challenges that are interfering with academic progress, including family or work obligations, food security, housing issues, transportation, and childcare.

- **Career and employment supports** including employment workshops, career navigation, resume workshops, mock interviews, alumni network events, and assistance with job or internship placements.
- **Financial supports** including tuition support, support for other education-related expenses (e.g., books, fees for certification exams, work boots, or uniforms), funds for transportation or childcare, as well as guidance on how to identify and access external funding opportunities (e.g., Pell grants and other types of financial aid).

**Figure 4.1** highlights some of the questions that can guide the development of the resource map—from an initial assessment of the student support services currently provided towards a subsequent assessment of

**Figure 4.1. Resource mapping questions**



Source: Alliance for Quality Career Pathways (2014). *Shared vision, strong systems: The Alliance for Quality Career Pathways Framework Version 1.0*. Washington, DC: Center for Law and Social Policy.

the resources available to remedy any gaps in or unmet need for additional student services.

The supports provided by community colleges and their partners need to align with and respond directly to the most pressing needs of students.<sup>81</sup> A central part of resource mapping involves determining the timing, frequency, and intensity of the supports provided, as well as relating these to the projected student needs. This allows for an early assessment of the potential costs associated with the supports provided.

Gathering information as part of resource mapping provides an opportunity to engage with different partners that provide student services—both within and outside of the community college—and to clarify roles and responsibilities for service delivery. Community colleges can use the resource mapping template featured in **Figure 4.2** to create an overview of the different support services provided and to determine who is responsible for delivering which supports.<sup>82</sup>

**Figure 4.2. Career pathways resource mapping template**

This resource mapping template is provided to assist partners in identifying available resources to support the development and operation of education, training, and related programming for career pathway, as well as potential resource gaps.

Organization Name	Key Programs	Primary Services	Service Restrictions	Targeted Populations	Related Resources: Space, Staff, Training Equipment, etc.	Other Notes	Contact Information
<b>Post-Secondary Education Partners</b>							
<b>Workforce Development Partners (WIOA partners, training providers, etc.)</b>							
<b>Community-Based/Human Services Partners</b>							
<b>Industry Partners</b>							
<b>Other Partners</b>							

Source: A Practical Guide to Developing Career Pathways, [https://www.michigan.gov/documents/ted/R5\\_5\\_MICPFramework\\_20180730\\_629836\\_7.pdf](https://www.michigan.gov/documents/ted/R5_5_MICPFramework_20180730_629836_7.pdf)



Finally, it is important to consider how students will access the student supports. Resource mapping provides an organizational overview of who will offer academic supports, non-academic (personal) supports, career and employment supports, and financial supports to the students. Further, colleges should consider how to engage internal and external partners so that they can collectively identify gaps in support services and improve how students access available services.

After identifying available supports and providers, the expert panel notes it is important for community colleges to develop processes for referring or connecting students to the different supports, especially those beyond the community college. A range of community-based organizations may be available to help students overcome barriers to successfully completing a career pathway, and staff at community colleges will be better equipped to facilitate referrals to these organizations when they are aware of the services they offer.

### **2. Assess students' needs and connect one-on-one to provide them with relevant supports, from intake to program completion and beyond.**

Accessing student supports can be difficult, especially when a broad range of student support services are made available by a network of partners within and outside the community college. For some students, navigating these services can be overwhelming. Many community colleges have started to embrace the importance of wraparound supports for students.<sup>83</sup> Institutions committed to offering such supports may need to encourage and help faculty to work more closely with student support staff. While FERPA regulations may prevent the exchange of information about individual students, the expert panel believes

community college administrators should consider whether there are workshops or trainings they can offer faculty to make them more aware of some of the challenges faced by the student populations, as well as the resources available to help students address those challenges. Pathway intake processes and assessments that are holistic can be used to match students to the supports they need to be successful as they start and progress along a career pathway. Today's postsecondary learners are, taken together, more diverse—and representative of the nation as a whole—than ever before. College staff, including counselors and advisors, may vary in their capacity to recognize and respond to the challenges faced by an ever-changing student body. Training, including implicit bias training, can help ensure educators are better-positioned to guide students in seeking the most relevant and helpful supports.

The expert panel recommends that during the career pathways recruitment and intake process, student support staff should conduct a comprehensive needs assessment with each student. This needs assessment should be holistic, focusing on both academic and non-academic (personal) issues.<sup>84</sup> This may include the student's educational and employment background, family and work obligations, learning preferences, financial situation, and any other aspect of the students' experience that may influence their progression along the career pathway. The primary aim of the assessment is to ensure students are matched with and connected to the right supports to help them be successful. The assessment can be done during a well-designed onboarding process, connecting each student with a designated advisor or career navigator. The Community College Research Center offers resources in *Redesigning Community College Student Onboarding Through Guided Pathways* that are

designed to help community colleges think about onboarding in more holistic ways to ensure students explore career and program options, choose a program direction, and develop a full-program plan.<sup>85</sup>

Students should leave the intake process with a clear overview of the steps and available supports along their chosen career pathway. In the Pathways to Healthcare Program at Pima Community College, a two-year college serving a largely nontraditional student population in Tucson, Arizona, advisors offer incoming students guidance on occupational program requirements and provide a program-specific checklist (“passport”) of steps students must complete, from pre-pathway enrollment through employment. **Figure 4.3** shows Pima’s Participant Plan Checklist, which is introduced by advisors to students when they begin their program. The checklist includes key events and milestones that students should attend to as they progress through their career pathways.

The plan was designed to serve as a blueprint that connects all program-related steps for students, and the checklist is a tool that advisors and other program staff can use to track students’ progress.

### 3. Integrate available supports into the student experience.

The expert panel believes faculty and staff should proactively provide student supports and modify supports appropriately as students progress through a career pathway. There are several ways of integrating and making student support services accessible along the career pathway. Embedding student support staff into pathway programs to continuously help students navigate training choices, provide support during training, and help them identify barriers to employment is one way to do this.

**Figure 4.3. Sample participant plan checklist**

- ☐ HPOG (program) information session
- ☐ Intake eligibility/commitment appointment
- ☐ Pima County One Stop Workforce Development Specialist appointment
- ☐ Referred to College Readiness (Y/N)
  - ☐ TABE scores
  - ☐ ACT Compass scores
- ☐ Mandatory Employability Skills Workshop
- ☐ Pima Community College advising (Student Services Advanced Specialist)
- ☐ Center for Training and Development information session
  - ☐ Received program passport (Y/N)
- ☐ Pima Community College credit: completed degree plan (Y/N)
  - ☐ Applied for FAFSA (Y/N)
- ☐ Student Support Specialist meeting
- ☐ Passport completion
- ☐ Training Plan completion
- ☐ Training Plan approved
- ☐ Training completed
- ☐ Workshops:
  - ☐ 123 Work: Employment Transition Workshop
  - ☐ Job Offer Academy
  - ☐ Resume Writing
  - ☐ Interview Technique
  - ☐ Computer Workshop
  - ☐ Pesco Sage, a career assessment that tests academic skills, aptitudes, learning styles, work attitudes, temperament and work ethic
- ☐ Employment specialist meeting
- ☐ Employed

Source: Gardiner et al. (2017)

Student support staff can also be embedded into individual college classes for a certain number of hours per week or term. For example, career counselors can on occasion attend classes and introduce job search strategies and resources as part of in-class activities.<sup>86</sup> At some colleges, faculty introduce career navigators as part of their instructional teams, have them participate

actively in class activities, and integrate student support services into class exercises. By integrating student supports in this way, it is easier for students to see the important role of the supports and to understand how these supports can facilitate their progress and completion of the career pathway.

Making student support staff accessible in the evenings and on weekends will enhance accessibility for students balancing work and family obligations. For some student populations, using technology and online formats can increase accessibility and nudge students to make better use of existing student supports. Virtual advising technologies can help colleges reduce costs while meeting increased demands for support. Instructors often use various Learning Management Systems, such as Blackboard, Canvas, D2L, and communication tools, such as Microsoft Teams among others, to communicate with students about assignments, online tests, and other course-related matters. These online platforms can also be used to alert students about job fairs, tutoring services, and other course-related student supports.

#### **4. Monitor student progress, academic and non-academic needs, and supports accessed.**

Identifying needs and connecting students with relevant supports do not end at intake. The expert panel encourages all staff and faculty who engage with students throughout their program of study to be attentive to changes in students' academic and non-academic barriers. They should watch for signs that students are struggling, such as failing grades, not turning in homework or assignments, and decreased participation in class. Upon detecting barriers, faculty and staff should refer or connect students to services that can help meet students' emerging needs. This requires that faculty

be keenly aware of and understand all the support services available, and that faculty and student support staff work in tandem.

Staff and faculty can ensure that students are able to progress along pathways by monitoring their progress and identifying barriers that students encounter. Coordination amongst staff and faculty supporting the same students is especially critical at transition points.<sup>87</sup> The expert panel encourages staff to pay particular attention to progress at transitions between education and employment, where students may experience challenges re-entering the career pathway, as these phases may offer practical opportunities for building in new supports.

There are several strategies for monitoring student progress. Some pathway programs have proactive advisors, who initiate contact with students several times during their progression along the career pathway; other programs also dedicate resources to provide follow-up supports to students after program completion.<sup>88</sup> Ongoing audits of a student's progress can be facilitated by institutional data on course completion and progress. Data on attendance and progress from Learning Management Systems support this type of monitoring. Project QUEST and the Valley Initiative for Development and Advancement (VIDA) embedded student audits within mandatory weekly workshops facilitated by a designated counselor. Students were required to hand in class attendance sheets as part of these workshops; the sheets documented their progress in the coursework.<sup>89</sup>

There is a growing range of early alert systems, such as Starfish,<sup>90</sup> that can be used to monitor student progress and to help student support staff identify students who are falling off track. Technological solutions can also be used to track how and when students access support services. As just one example, some community colleges are

using Salesforce, a customer relationship management tool, to track when and how students make use of support services.

### 5. Consider hiring sector-specific career navigators.

The expert panel encourages community colleges to be proactive about helping students identify the best career fit for them. Discipline- or sector-specific career navigators, advisors, mentors, or coaches can tailor their advising and career guidance to the occupational sector in which a student plans to seek employment.<sup>91</sup> When implemented well, navigators and career coaches can positively affect a student's retention in a program and completion of a credential. Navigators can provide students with individual coaching, career planning, and assistance navigating the transition to further education and employment.<sup>92</sup> Navigators can also serve as an important resource in connecting students to necessary services.<sup>93</sup> Hiring additional staff to serve as navigators can be costly. Therefore, community colleges could consider redeploying existing advisors with a new focus on a particular industry sector.

At one of the community colleges in the Northeast Resiliency Consortium, the career coach engaged students throughout the duration of the program to deliver proactive, personalized one-on-one advising. As students neared program completion, the career coach passed them on to one of two employer relations coordinators, who would then connect students with job opportunities. The career coach was an integral part of the support services team, and the program's employer relations specialists reportedly relied on the career coach to identify students nearing completion to engage with job searching services.<sup>94</sup>

## Potential Obstacles and the Panel's Advice

**OBSTACLE:** *Advisers and other staff charged with delivering these supports have caseloads that are too large for them to be able to handle the comprehensive needs of students.*

**PANEL'S ADVICE:** Providing comprehensive student supports, especially when tailored to the individual needs of each student, can be costly in support staff time and resources. Advising structures and budgets often cannot support frequent one-on-one advising with large numbers of students. To the extent possible, facilitating group sessions for students can enable support staff to convey general information and address common needs and issues. Delivering this general information to a large group of students allows advisors more time for individual sessions. Creating a common place where concerns are raised in a protected environment also fosters peer relationships between students so that they can support one another inside and outside the classroom.

As part of the Northeast Resiliency Consortium, one of the community colleges facilitated weekly group workshops on self-care and related resiliency-related topics, providing students a shared space to discuss personal and professional challenges and solutions related to their participation in the program.<sup>95</sup> To facilitate attendance, the sessions were offered immediately before required coursework. Group advising sessions were also offered by VIDA to support students learning from one another's experiences and to foster a peer support network.<sup>96</sup>



**OBSTACLE:** *Some staff may lack knowledge and skills needed to design and deliver coordinated comprehensive student supports. Faculty may lack awareness of the value and existence of the array of student supports that are available.*

**PANEL'S ADVICE:** The expert panel believes community colleges should invest resources to develop faculty and staff competencies to coordinate and collaborate on the delivery of student support services. Professional development and/or professional credentialing of student support staff (especially in relation to counseling) should be considered.

Colleges may consider investing in professional development to assist more faculty and staff in understanding the different student support services provided and how these services intersect with student enrollment, retention, and completion.<sup>97</sup> Actively engaging faculty and staff in the resource mapping exercise facilitates a stronger understanding of the types of services provided and when and how students may need to access these. Ideally, resource mapping exercises involve relevant faculty and staff.

Another strategy is to develop and organize “student success teams,” an advising/instructional team that includes a navigator or student success coach. Such teams allow for a more coordinated, and potentially integrated, approach to delivery of student support services.<sup>98</sup> There are a variety of sources of information for implementing potentially effective student success teams. They include networks of CTE professionals, experts in the design of career pathways more generally, and peer colleges serving the career needs of similarly situated students.

**OBSTACLE:** *It is costly to deliver comprehensive supports to students throughout all phases of their learning.*

**PANEL'S ADVICE:** Community colleges can partner with community-based organizations and other local community partners, such as American Job Centers, to coordinate and cover

the costs of providing the needed student support services by combining different funding streams (braided funding).

VIDA is a community-based organization in southern Texas that supports participants' full-time enrollment in a college through intensive advising and financial support. It receives funding from local Economic Development Corporations and cities and counties in the region to cover the costs of training for VIDA participants.<sup>99</sup> In a similar vein, Project QUEST combined funding from local government and the private sector to cover the costs of providing comprehensive student supports.<sup>100</sup>

**OBSTACLE:** *Very few students choose to participate or receive services without proactive efforts of community colleges.*

**PANEL'S ADVICE:** Students may be unaware of student support services, unsure of how to access or make use of student supports, or even reluctant to seek out relevant supports. The expert panel recommends embedding utilization of student support services into the overall program experience. There are several ways to do this. One strategy is to integrate student support services into the existing coursework and student schedules. As part of the Northeast Resiliency Consortium, staff delivered support services—in the form of workshops on interview preparation, time management, study skills, and self-care—during required pre-program orientation sessions or in class during scheduled lecture times. These in-class sessions reached more students than out-of-class sessions did.<sup>101</sup>

Another strategy to maximize utilization is to require students to utilize support services. In Project QUEST and VIDA, active participation in weekly group advising sessions was mandatory for all students in each program.<sup>102</sup> The group sessions—facilitated by designated counselors—covered program expectations and participant responsibilities, budgeting and saving, time management, balancing work and family obligations, notetaking and study strategies, and job interview preparation.



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Students participating in Project QUEST are required to participate in weekly Vision, Initiative, and Perseverance (VIP) sessions. These group sessions, facilitated by career counselors, focus on life skills, time management, study and test-taking skills, critical thinking, conflict resolution, and workforce readiness, among other topics. Students are also required to bring in signed course attendance sheets, allowing the counselors to monitor the students' progress in occupational coursework.<sup>103</sup>

Community college faculty and staff should also identify opportunities to connect students to support services in off-campus settings, such as activities or events held by community-based organizations or through other social service agencies.

## Recommendation 5: Develop and continuously leverage partnerships to prepare students and advance their labor market success.

Career pathways that leverage employment-focused partnerships offer students both classroom- and work-based experiences to acquire the skills needed to be ready for work on day one. The benefits of investing in, building, and deepening employment-focused partnerships include:

- improving the relevance and alignment of the curriculum to employer or industry needs;
- expanding the opportunities for students to engage meaningfully with employer partners through employer presentations, onsite visits, work-based learning opportunities, and career fairs; and

- increasing the potential for job placement and advancement.

Ultimately, improving student labor market outcomes benefits students, employers, and colleges alike. There is an incentive for administrators, faculty, and staff to work together with employment-focused partners to design, implement, and continuously evaluate career pathways.

WWC staff and the expert panel assigned a *moderate* level of evidence to Recommendation 5, based on 11 studies of interventions that include employment-focused partnerships. Seven of the studies<sup>104</sup> meet WWC group design

### Highlights from the Field

#### Developing and leveraging industry partnerships

A consortium of four educational institutions—referred to as “hubs”—in three states developed and implemented a TAACCT Round 2-funded initiative aimed at expanding the breadth and effectiveness of the training options and career pathways through which participants could work toward careers in the shale oil and gas industry.

Central to development and implementation of the training options was sustained industry partnerships. Over the course of the grant, the ShaleNET consortium engaged more than sixty unique employers and industry organizations.

Each hub’s industry engagement was maintained by designated Hub Directors and Career Counselors, and supported by advisory groups and quarterly ShaleNET hub meetings. These meetings provided industry representatives with opportunities to learn more about ShaleNET, to give their input about program design and activities, and to explore how ShaleNET training programs could help them meet their workforce needs. This included valuable input and feedback about core competencies and training components in the training programs. For example, industry representatives were instrumental in helping ShaleNET hubs set up their well site equipment, maintain it, and use it to provide meaningful hands-on learning.

In addition, employers also provided ShaleNET students opportunities for work-based learning, including site visits and internships. These opportunities allowed students to get into the field and interact with industry equipment and workers.

Finally, the ShaleNET partners provided leveraged resources by funding scholarships and donating equipment and supplies. These included pumps, control valves, controllers, hard hats, safety goggles, and gloves.

(Dunham et al., 2015)

**Table 7. Results of Meta-analysis for Recommendation 5**

Outcome Domain	Statistically significant and positive	Indeterminate	Statistically significant and negative
Short-term employment	●		
Medium-term employment		●	
Short-term earnings	●		
Medium-term earnings	●		
Note: Across the 11 studies, there were findings in four outcome domains even though all six labor market outcome domains (see Box 1) were relevant for this recommendation. None of the 11 studies included findings that meet WWC standards in the following outcome domains: (1) long-term employment; or (2) long-term earnings.			

standards without reservations, and the other four studies<sup>105</sup> meet WWC group design standards with reservations. An additional four studies<sup>106</sup> include employment-focused partnerships but do not report any labor market outcomes.

Results of a meta-analysis indicate a statistically significant positive effect of these interventions on short-term employment and short-term earnings. Effects on medium-term employment were indeterminate. Educational outcomes were not considered for this recommendation. The average effect size is not statistically significant and negative for any of the three labor market outcome domains relevant to this recommendation. In 10 of the 11 studies used to support Recommendation 5, employment-focused partnerships are a secondary component of the tested intervention. See [Appendix C](#) for a detailed rationale for the level of evidence assignment for Recommendation 5.

It is important to acknowledge the limitations in the current research available on employment-focused partnerships. First, the majority of the interventions in the studies referenced in this practice guide engaged external employment-focused partners such as employers, workforce boards, industry associations, and American

Job Centers. However, the studies did not directly test employment-focused partnerships as an intervention; rather, these external partnerships were a component of the larger intervention. Second, available research often includes varying information on the strength of external partnerships, such as the quality of the relationships or how deeply partnership members engage and collaborate with one another. Finally, because employers may have multiple partnerships with multiple colleges, students in study comparison groups could receive and benefit from some level of services provided by these partners outside of a specific intervention. This loss of contrast between treatment and comparison groups can make it difficult to tease out differences in labor market outcomes caused by the interventions.

This section describes strategies, examples, and tools that can support community college administrators, faculty, and staff in their efforts to build, sustain, and leverage employment-focused partnerships. All figures and mentions of specific community colleges in Recommendation 5 are offered as examples only and should not be read as endorsements of specific products or approaches.

## How to Carry Out the Recommendation

The guidance below is informed by the studies that support the recommendation as well as the expert panel’s knowledge of strategies and resources available to help implement the recommendation.

### 1. Identify ways to get employers strategically engaged in each aspect of planning and implementing career pathways.

When employers and industry partners are continuously engaged in all aspects of career pathways design and implementation, students are better prepared when they take an exit along the career pathway for

**Figure 5.1. Examples of employer engagement**

<b>Assistance</b>	<ul style="list-style-type: none"> <li>• Recruit students</li> <li>• Provide mentors</li> <li>• Provide work-based learning experiences or in-service activities for instructors</li> <li>• Provide industry-based training to instructors</li> <li>• Support instructors’ memberships/participation in trade associations</li> <li>• Provide work-based learning experiences for students, such as simulations, labs, field trips, internships, clinicals, paid and unpaid work experiences</li> <li>• Teach a module or topic</li> <li>• Advise on resource needs, including equipment, labs, staff qualifications, facilities</li> <li>• Assist in the acquisition of equipment and supplies</li> <li>• Assist with placement of program completers</li> <li>• Provide resources, such as equipment, materials, facilities</li> <li>• Share libraries of visual aids, books, and magazines</li> </ul>
<b>Assessment and Counsel</b>	<ul style="list-style-type: none"> <li>• Review curriculum, including objectives, structure and length, curriculum frameworks and course descriptions, assessments, industry credentials, safety, course materials</li> <li>• Advise on academic, technical, and employability standards</li> <li>• Modify existing programs and/or identify new or emerging fields for which programs should be developed</li> <li>• Review student outcomes, such as completion rates, placement rates, and state licensing exam outcomes</li> <li>• Assist in surveys of local labor market needs</li> <li>• Assist in identifying equipment needs</li> <li>• Assess the equipment and facilities available and make recommendations as needed</li> </ul>
<b>Promotion and Advocacy</b>	<ul style="list-style-type: none"> <li>• Interpret the career pathway and program to the community</li> <li>• Serve as an advocate of the career pathway and program</li> <li>• Seek legislative support for the college and its programs</li> <li>• Present to civic groups</li> <li>• Write newspaper articles</li> <li>• Assist in raising funds for scholarships, equipment, and other program needs</li> <li>• Leverage community resources and broker community partnerships</li> </ul>

Source: <https://www.advancingcredentials.org/toolkit/index.php>

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employment. Community colleges can engage employment-focused partners in a variety of ways and at various stages of career pathways planning and delivery, as well as when they are supporting students with job searches and placement. As shown in **Figure 5.1**, employer engagement can be in the form of curriculum planning and review, assessment of local labor market information, assistance with student recruitment, provision of mentorship or work-based learning opportunities, as well as active promotion of the career pathway program.

The level of engagement of employment-focused partners may vary depending on the partner type and local or regional context of a given career pathway. For example, newly created pathway programs for emerging industries may initially involve few partners in several aspects of planning, but eventually involve more partners who are involved in different aspects of ongoing program implementation and improvement efforts. Jobs for the Future’s *A Resource Guide to Engaging Employers*<sup>107</sup> includes a “ladder of employer engagement” that depicts how

employers can play roles that range from advising, capacity building, co-designing, and convening to leading (see **Figure 5.2**). The expert panel recommends that the specific stages and activities be modified to local needs and circumstances, and that community colleges remember the best way to increase employer engagement is to take the time to build meaningful relationships with employers.

Employers and industry partners can serve on advisory committees as strategic partners for the program.<sup>108</sup> In order for an advisory committee to be effective, its members must be engaged strategically at various levels of program design and implementation.<sup>109</sup> When given the opportunity to provide meaningful feedback and guidance during the college’s planning, members can indirectly shape students’ experiences and outcomes in career pathways.<sup>110</sup> The Association for Career & Technical Education offers several illustrative tools and examples to promote strategic engagement with industry partners in advisory boards or committees.<sup>111</sup>

**Figure 5.2. Sample Ladder of Employer Engagement**

	New Relationship		Working Relationship		Strategic Partnership
	Level I	Level II	Level III	Level IV	Level V
<b>Key employer role</b>	Advising	Capacity-building	Co-designing	Convening	Leading
<b>Stage of relationship</b>	Initial contact / new relationship	Establishing trust and credibility	Working relationship	Trusted provider and collaborator	Full strategic partner
<b>Activity examples</b>	Discuss hiring needs, skills, competencies; advise on curricula; contract training; hire graduates	Job site tours; speakers; mock interviews; internships; needs assessment; loan/donate equipment; recruiting	Curriculum and pathway development; adjunct faculty and preceptors	College-employer sectoral partnerships	Multi-employer / multi-college partnerships

Source: Wilson, R. (2015). *A Resource Guide to Engaging Employers*. Boston: Jobs for the Future. (<https://jfforg-prod-new.s3.amazonaws.com/media/documents/A-Resource-Guide-to-Employer-Engagement-011315.pdf>)



Employment-focused partnerships can support the design and delivery of instructional content and activities that are relevant and engaging to students. Employers, for example, can offer students valuable exposure to work environments through various work-based learning opportunities, such as hosting experiential field trips, internships, clinical placements, or apprenticeships.<sup>112</sup> Students can also benefit by learning from industry experts serving as instructors or guest lecturers. Instructors can also re-engage former students by inviting them to serve as guest speakers or mentors for current students.

Employers and industry partners can also play a critical role in delivering job search and placement supports to career pathways students. Career fairs and hiring events provide students with opportunities to meet and network with potential employers.<sup>113</sup> Employers who are actively aware of or engaged in the design and delivery of a career pathway can help prepare students through mock interviews. The partner may even agree to interview or hire a certain portion of students who complete the pathway's programs and credentials.

### 2. Conduct an inventory to identify current and potential employment-focused partnerships.

In order to best leverage employment-focused partnerships to support students' labor market success, community colleges should conduct an inventory to identify current and potential partners and think critically about how to engage with them.

The panel suggests community colleges consider the following in mapping out existing and potential employment-focused partnerships:

- Who is the employer point of contact?
- What is the current engagement of the employer?

- Does the employer engage with multiple departments or offices at the college?
- How would you like the employer to engage with the college in the future?
- Is there a formal agreement (e.g., Memorandum of Understanding) in place with the partner?

To identify new employment-focused partners, colleges can first connect with local workforce boards. They can also reach out to local, state, or regional industry associations. National industry associations and CTE accreditation bodies can also be leveraged. These organizations may offer job placement data that may provide information about prospective employment-focused partners. If a career pathway has been established for a few years, a college should consider accessing and analyzing data about where its graduates are employed, and engage any employers not already partnering with the college.

Colleges may consider conducting a “self-check” to identify opportunities to strengthen or deepen partnerships with leaders in specific occupational sectors that are relevant to the career pathway(s) offered by the college. The *Employer Engagement Toolkit* created through the ECMC Foundation-funded Advancing Credentials Through Career Pathways initiative includes an institutional checklist for employer engagement, featured here in **Figure 5.3**.<sup>114</sup> The checklist assesses the level of engagement with local employers in terms of collaboration around job fairs, mentorship and work-based learning, and post-graduation hiring, among other activities.

The National Council for Workforce Education suggests colleges should develop an employer engagement plan that includes an environmental scan of internal and external perceptions of employer engagement and its effectiveness; college goals; an employer checklist and database; and a communication plan that covers internal and external communications.<sup>115</sup>

**Figure 5.3. Checklist for employer engagement**

This self-check is for your information only. It may be completed by a variety of college staff followed by a discussion of options for gathering and gaining access to information.

#### Gathering Input

1. Do employers offer internships geared specifically to your program's students?  
☐ Yes      ☐ No      ☐ Don't Know
2. Are your students offered job shadowing opportunities with employers in your area?  
☐ Yes      ☐ No      ☐ Don't Know
3. Do you include guest speakers or industry tours as part of your program?  
☐ Yes      ☐ No      ☐ Don't Know
4. Do you have an up-to-date list of guest speakers/industry tours for your program courses?  
☐ Yes      ☐ No      ☐ Don't Know
5. Have you continued to grow the list and add new speakers/tours as new companies come to your area?  
☐ Yes      ☐ No      ☐ Don't Know
6. Do employers provide mentorship for your students throughout their program?  
☐ Yes      ☐ No      ☐ Don't Know
7. Does your college hold career fairs?  
☐ Yes      ☐ No      ☐ Don't Know
8. If so, are they sector specific?  
☐ Yes      ☐ No      ☐ Don't Know
9. Has the number of employers participating in career fairs grown over the past 5 years?  
☐ Yes      ☐ No      ☐ Don't Know
10. Are both large and small employers represented?  
☐ Yes      ☐ No      ☐ Don't Know
11. Do you include employers in mock interviews to help students prepare for job searches?  
☐ Yes      ☐ No      ☐ Don't Know
12. Do you know the employment rate of your graduates for each program your college offers?  
☐ Yes      ☐ No
13. Do you know which employers hire your graduates year after year?  
☐ Yes      ☐ No
14. Do you know which employers don't hire your graduates and the reason(s) why?  
☐ Yes      ☐ No
15. Do employers send their current employees to your college for continuing education and skills upgrades?  
☐ Yes      ☐ No      ☐ Don't Know
16. Do employers suggest/recommend your program to job candidates who lack needed skills?  
☐ Yes      ☐ No      ☐ Don't Know

Source: <https://www.advancingcredentials.org/toolkit/index.php>

### 3. Designate staff time and resources to build and sustain employment-focused partnerships.

Engagement with employment-focused partners allows college administrators and staff opportunities to better understand employer and industry expectations and labor market needs. When considering the benefits of such partnerships, administrators should also consider how they will invest resources and allocate staff time to build and then maintain the partnerships. For each career pathway, it will be important to determine how many staff will need to dedicate part or all of their time to engaging employers and industry partners. When feasible, employment-focused partnerships can be facilitated by providing physical space on campus for employer engagement and for employers to engage directly with students and faculty.

Involving employers and industry partners in the planning and design of career pathways may improve job placement rates when students complete their pathway studies.<sup>116</sup> When colleges communicate openly and frequently with their partners, they are better equipped to respond to feedback and concerns with appropriate adjustments to the program or curriculum to better prepare students for employment.

To ensure continuous engagement and communication, the expert panel believes it is important for colleges to establish a timeline for formal and informal check-ins with their employment-focused partners. In emerging industries, this timeline may entail more frequent communications.

Further, the expert panel suggests administrators, faculty, and staff within—and possibly even across—career pathways should develop communication plans so they are clear about who is reaching out to which employers with specific requests.

This may involve setting up a data system to organize contacts and coordinate and track communications. Investing in this type of data system can both streamline and improve communications with employers, who may otherwise receive multiple, perhaps even conflicting, requests from a college.

### 4. Collaborate with employers and industry partners to provide students hands-on learning opportunities that are relevant to occupations along their chosen career pathway.

When career pathways provide students with hands-on exposure to occupations they are pursuing—or might pursue in the future—students can develop realistic expectations about those occupations. Project-based learning, high-fidelity simulations, and experiential field trips are strategies that instructors can use to align course content and delivery with students' career interests.<sup>117</sup> Internships, work-based learning opportunities, clinical placements, and apprenticeships allow students to gain employment experience as they progress along a career pathway. Several examples of employer engagement, each from Wisconsin's *Making the Future* initiative, are featured in **Figure 5.4**.

In 2017, some 50 percent of full-time students and 78 percent of part-time students attending two-year postsecondary institutions were employed.<sup>118</sup> Students are often employed while pursuing postsecondary studies so they can balance their educational, personal, and financial obligations. To the extent possible, faculty and staff should work with students to seek employment that is aligned to students' career interests, such as employment in their targeted industry, and conducive to students' educational goals, for example on campus or on a flexible work schedule. They also should find ways to connect students' work experience to their education through reflection activities.

**Figure 5.4. Examples of employer engagement**

Moraine Park Technical College's welding boot camp represents a unique expansion of the employer's role in education and training at the college. The welding boot camp includes a 72-hour paid internship for all participants with a local employer who selects the interns after reviewing resumes and test scores (math and reading, as well as a mechanical assessment), which then provides entry to the welding boot camp at the college. While the college initially had to recruit employers to participate and offer internships, it now has more employers wanting to participate than available slots. This process has resulted in an overall job placement rate of 86% within three months of boot camp completion. The internship program attracted students who would never otherwise have considered college, but the strong connection with employers and the possibility of a job motivated participation. As one student noted, "my [internship] supervisor tells me I have potential as a welder and I should have no problem getting employed. This is very encouraging. There aren't many people or places willing to teach a skill like this to a beginner."

Both Blackhawk Technical College and Chippewa Valley Technical College developed new internship opportunities for manufacturing students. Blackhawk used an internship coordinator to develop opportunities for students in the industrial maintenance program, while CVTC assigned faculty in the machine tool program to manage its program. Both colleges identified a course within their respective manufacturing programs where an internship could be taken as an alternative to a program course. And both colleges established formal protocols to guide, manage, and assess the internship activity.

Another aspect of expanded employer partnerships involves preparing students for employment and providing priority consideration in hiring decisions. Southwest Technical College engaged local employers in the development of the Gold Collar Certificate training, and successfully worked with a number of employers to provide student tours of their facilities, help prepare students for job interviews, and offer priority hiring for students who complete the bridge. Notably, the 3M Company adapted its hiring profile to ask if students had earned the GCC, and publicly indicated that completers receive priority consideration.

Source: Price et al. (2016)

Colleges also can set up "learn-and-earn" models, such as internships, cooperative education, pre-apprenticeships and apprenticeships, federal work-study, or practicums, that allow students greater access to work experiences related to their career-oriented instruction and financial assistance.<sup>119</sup> Year Up, a national workforce training program for young adults living in urban areas, is an example of a program that applies the "learn-and-earn" model. It has established relationships with local businesses so that Year Up students are placed in paid internships in their targeted industry during the second half of the program.<sup>120</sup>

In cases where students are pursuing stackable credentials, they may reach a point along their career pathway where they would benefit from gaining workplace experience before pursuing further education, credentials, or employment. This is because stackable credentials are aligned to industry certifications and represent "exit points" at which students have reached a designated milestone. In other words, a student earning a certification may be prepared for the first level of employment and can pick up where they left off when they return to continue their training. As appropriate, faculty and staff can advise students to take advantage of employment opportunities at transition points along the career pathway. When doing so, they should consider how and when they will encourage students to return for additional education and training, and what kinds of supports students will need to successfully re-enter their career pathway program.<sup>121</sup>

### **5. Regularly review the employment-focused partnership inventory to assess whether or not the right partners are involved to help advance students' labor market outcomes.**

Community college administrators and staff can use partnership inventories to identify gaps that may need to be filled

by strategically engaging employers and industry partners. If implementing a strategic plan for employer engagement, they can systematically track engagement activities and assess whether the efforts are benefitting students in their career pathways.

Ongoing communications with current and former students and employers is important for program improvement. Colleges should consider developing and implementing mechanisms to allow employers the opportunity to provide feedback on their pathways programs and student hires, including the extent to which colleges are preparing workers with the right skills.<sup>122</sup> Mechanisms may include phone calls, emails, surveys, and face-to-face meetings. Colleges can also share program and student successes with employers, along with information about improvements they are making based on the feedback employers and industry partners provided.

Students and employers can provide feedback on the benefits and challenges of both the curriculum and its hands-on learning opportunities, potentially informing improvements to the design and implementation of career pathways programs. Communication with students and employers can take place formally and informally.<sup>123</sup> Semi-annual partner roundtables provide one such venue, in that these roundtables provide colleges and partners a formal opportunity to discuss the career pathways model, solicit feedback, and present results, with the expectation that the college will implement the feedback into the model or pathway design.<sup>124</sup>

## Potential Obstacles and the Panel's Advice

**OBSTACLE:** *Implementing hands-on learning opportunities for career pathways students requires a high level of coordination between college and employer, which may be costly and time consuming.*

**PANEL'S ADVICE:** The demand for hands-on learning opportunities—whether offered on campus in the classroom or lab or offered at a job site—requires strong, well-coordinated partnerships between employer and campus staff. These well-coordinated partnerships are often forged over a period of time, giving both college and employer a clear understanding of the benefits to each of the partnership. Where possible, colleges can dedicate career counselors or other staff to helping make and maintain connections between them and employers. Findings from an evaluation of the Accelerating Connections to Employment initiative suggest it may be necessary to hire both a career navigator to guide students along their career pathway and a job developer to help students secure hands-on learning opportunities and post-program employment.<sup>125</sup>

Planning tools such as the one featured in **Figure 5.5** can help colleges determine the best opportunities to integrate work-based learning into their career pathways offerings. Such tools can also help colleges remain attentive to the logistics of partnering with employers, such as any pre-training requirements, supervision expectations, paperwork, and liability when students are on a job site. The U.S. Department of Education's National Center for Innovation in Career and Technical Education prepared a *Work-Based Learning Toolkit* that includes several strategies for and examples of engaging employers



**Figure 5.5. Planning tool for work-based learning**

Type Of Work-Based Experience	Employers Interested	Employer Needs	Timeline	Staff Responsible	Next Steps
Internship, OJT, etc.	List employers who are open to hosting	Summarize what the interested employers require from you to host	Target date to begin work-based experience	Lead within your organization	Action items to begin work-based opportunities
<b>Paid / Unpaid Internship</b> <i>Employers define a brief job or project that requires the intern to use and improve specific skills under the guidance of a supervisor. Learning goals and achievement goals are set by the employer and the experience is formally incorporated into the training curriculum. When the internships are paid stipends are set and paid by the employer unless funds are available from the training program. Remember that unpaid internships must comply with the Fair Labor Standards Act.</i>					
<b>Temporary Employment</b> <i>Employers “hire” the employee for a set duration to perform duties similar to those in the jobs participants are training for. Often, this occurs through a temporary employment agency. Temporary employment can be more easily incorporated into a training program if work is part-time so that participants can spend roughly half their program time working and half in training and skills classes.</i>					
<b>WIOA On-the Job Training</b> <i>Employers provide short-term, structured training as part of their workers’ job responsibilities. The public workforce system reimburses the employer, generally up to 50 percent of the participant’s wages, for the costs of training and supervision. This can help incentivize businesses to hire new workers who still require some occupational training to succeed in their new job.</i>					
<b>Other</b> Ask employers for other options such as apprenticeships that work for them for trainees to gain real job experience at their company during training.					

Source: Adapted from Job for the Future’s Employer Engagement Toolkit, Tool 4.5 (<https://jfforg-prod-new.s3.amazonaws.com/media/documents/4.5-Work-Based-Experience-092415.pdf>)

in work-based learning. Topics include addressing employers' liability concerns, demonstrating to employers that participants have the necessary skills for the workplace, offering a range of work-based learning activities to allow employers to participate at different levels, and reaching employers through business intermediaries.<sup>126</sup>

**OBSTACLE:** *Employers may not understand the value of partnering with community colleges to help train workers who are not (yet) their employees.*

**PANEL'S ADVICE:** Partnering with community colleges can provide employers access to a pool of talent whose skills are valuable to the employer and the industry; it can also ultimately reduce employers' costs to identify, recruit, and train new employees (or retrain current ones).<sup>127</sup> Still, some employers may be hesitant to partner with colleges. Colleges can proactively share data with employers to help them see the value of investing time and resources into career pathways partnerships.<sup>128</sup> They can share student outcomes data, such as program completion rates, credential or degree attainment rates, and job placement and retention rates. They can also share anecdotal evidence collected through formal or informal communication with former students and their current employers and with existing employment-focused partners. Colleges can also explore employers' interest in offering hands-on learning opportunities for potential employee candidates. Finally, they can engage industry associations and advocacy groups to help secure employers' buy-in to earn-and-learn concepts.

When appropriate, a college may need to demonstrate the return on investment that employment-focused partners can expect from partnering with it. Community colleges can

consider the following steps for calculating that return:

1. Listing investments of time, money, and resources of the employment-focused partner.
2. Listing benefits that will accrue to the employer as a result of its investment.
3. Translating both costs and benefits into dollar values.
4. Demonstrating the training program was responsible for generating the benefit, such as time savings, productivity increases, or personnel savings.<sup>129</sup>

When planning work-based experiences, colleges should be mindful that some employers may be hesitant to support or host these opportunities. Some employers may have concerns about Unemployment Insurance, Workers Compensation, and/or liability. Where possible, colleges should work with legal counsel from their institution and with their state's attorney general to explore ways to reduce or share such risks with employers.

Another way to secure employer support is to engage employers in conversations about the characteristics of an ideal employee candidate. Such conversations can help the college determine how to evaluate the quality and preparedness for future employment of students completing the college's programs. Colleges can tailor their curriculum, instruction, and assessments to evaluate technical or employability skills and to prepare students for specific industry certification exams that employers value, and often require.

## Glossary

### A

**academic program review** is a process that evaluates the status, effectiveness, and progress of academic programs and helps identify the future direction, needs, and priorities of those programs. Both student and community needs may be taken into consideration when conducting academic program review for career pathways programs.

**acceleration strategy** encompasses varying ways of shortening the time required for completing basic skills training and occupational coursework. These strategies include compressed courses, co-requisite courses, integrated basic skills training, and awarding credit for prior learning, among others.

**administrator** refers to any person who is in a position of authority or who manages people, practices, and policies at a postsecondary institution of education.

**adult education programs** provide academic instruction and education services below the postsecondary level that increase an individual's ability to: read, write, and speak in English and perform mathematics or other activities necessary for the attainment of a secondary school diploma or its recognized equivalent; transition to postsecondary education and training; and obtain employment.

**adult learning theory** is the concept or study of how adults learn and how it differs from children. Adult learning theories provide insight into how adults learn, and can help instructors be more effective in their practice and more responsive to the needs of the learners they serve.

**advisory committee** refers to a group of local employers and other stakeholders involved in providing strategic guidance on decisions related to the implementation, improvement, and evaluation of career and technical education programs.

**American Job Centers** provide free assistance to job seekers for a variety of career and employment-related needs.

**apprenticeship** is an industry-driven, high-quality career pathway where employers can develop and prepare their future workforce, and individuals can obtain paid work experience, classroom instruction, and a portable credential.

**articulation agreement**, as defined in the Strengthening Career and Technical Education for the 21st Century Act (Perkins V), means a written commitment– (A) that is agreed upon at the State level or approved annually by the lead administrators of– (i) a secondary institution and a postsecondary educational institution; or (ii) a subbaccalaureate degree granting postsecondary educational institution and a baccalaureate degree granting postsecondary educational institution; and (B) to a program that is– (i) designed to provide students with a nonduplicative sequence of progressive achievement leading to technical skill proficiency, a credential, a certificate, or a degree; and (ii) linked through credit transfer agreements between the 2 institutions described in clause (i) or (ii) of subparagraph (A) (as the case may be).

## B

**basic skills** refers to foundational/prerequisite skills—typically in reading, writing, and math—necessary for students to succeed in career and technical education coursework.

**block scheduling** refers to scheduling courses for longer periods of time, resulting in fewer but longer class periods.

**braided funding** is the weaving together of various federal, state, and private funding streams and resources.

**bridge program** provides basic (or prerequisite) skills training required for students to pursue occupational coursework. Bridge programs act as pre-college or pre-pathway onramps to occupational training, and are sometimes referred to as “pre-pathway bridge programs.”

## C

**career and technical education (CTE)**, as defined in the Strengthening Career and Technical Education for the 21st Century Act (Perkins V), is organized educational activities that (A) offer a sequence of courses that— (i) provides individuals with rigorous academic content and relevant technical knowledge and skills needed to prepare for further education and careers in current or emerging professions, which may include high-skill, high-wage, or in-demand industry sectors or occupations, which shall be, at the secondary level, aligned with the challenging State academic standards adopted by a State (ii) provides technical skill proficiency or a recognized postsecondary credential, which may include an industry-recognized credential, a certificate, or an associate degree; and (iii) may include prerequisite courses (other than a remedial course) that meet the requirements of this subparagraph; (B) include competency-based, work-based, or other applied learning that supports the development of academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of an industry, including entrepreneurship, of an individual; (C) to the extent practicable, coordinate between secondary and postsecondary education programs through programs of study, which may include coordination through articulation agreements, early college high school programs, dual or concurrent enrollment program opportunities, or other credit transfer agreements that provide postsecondary credit or advanced standing; and (D) may include career exploration at the high school level or as early as the middle grades.

**career lattices** (also referred to as career ladders) help people visualize the potential job pathways available as they progress through a career by graphically depicting the occupations and developmental experiences within an industry. They consist of a group of related jobs that make up a career, and often include a pictorial representation of job progression in a career as well as detailed descriptions of the jobs and the experiences that facilitate movement between jobs.

**career navigator** is a student support staff member who primarily assists students in clarifying and linking academic, personal, and professional goals in relation to a particular occupation.

**competency-based education** is 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.

**contextualized instruction** refers to instructional strategies that make explicit connections between learning of basic skills and occupational content.

**co-requisite courses** allow students to enroll in basic skills training and occupational courses simultaneously. Sometimes referred to as *dual/concurrent enrollment*.

**credit for prior learning** refers to awarding credit for the knowledge and skills a student gained through past work and life experience.

## D

**degree** refers to an award or title conferred by a postsecondary education institution upon a student for the completion of a program of study. A type of credential.

**does not meet What Works Clearinghouse group design standards** identifies a group design study with a low level of causal evidence. This is the rating given to studies with causal research designs that were not implemented rigorously enough to conclude with confidence that the intervention caused the observed changes in outcomes.

## E

**employment-focused partnerships**, for the purpose of this guide, are defined as partnerships between community colleges, employers, and industry partners (workforce boards, industry associations, and American Job Centers, for example) that focus on supporting the educational and labor market outcomes of students who participate in career pathways.

## F

**faculty** refers to any individual who teaches full- or part-time at the postsecondary level. This includes instructors and adjunct professors; it can also include graduate students and other staff responsible for teaching courses.

**family sustaining employment** is employment that pays a family-sustaining wage, offers benefits including paid sick leave, and offers career pathways that provide opportunities for wage and career advancement.

**flexible instruction** refers to different ways of offering coursework at times, places, and in formats that accommodate and facilitate participation by students balancing their education with work and family obligations. These ways include evening and weekend courses, block scheduling, self-paced learning, and online learning.

**flipped classroom** is an instructional strategy and a type of hybrid learning focused on student engagement and active learning that requires students to learn and review content prior to classroom instruction. This gives the instructor a better opportunity to deal with mixed levels, student difficulties, and differentiated learning styles during in-class time.



## G

**group design standards** are the set of standards used by the What Works Clearinghouse to review studies. These standards are used to evaluate the strength of the evidence of the effectiveness of educational interventions. Studies are given a rating of *Meets WWC Group Design Standards without Reservations*, *Meets WWC Group Design Standards with Reservations*, or *Does Not Meet WWC Group Design Standards*.

## H

**hybrid learning** combines face-to-face classroom instruction with online learning, reducing classroom contact hours. Sometimes referred to as blended learning.

## I

**integrated basic skills instruction** refers to a curriculum design where **basic skills** instruction and occupational content instruction are delivered simultaneously, often by a team comprising a basic skills instructor and an occupational content instructor.

**internship** is a work-based learning opportunity provided by partnerships between educational institutions and employers to give students practical experiences in their field of study.

## L

**labor market information** refers to data and other information from employers that can be used to understand labor market conditions and trends in a particular industry and geographical area.

**license** refers to a credential granted by a federal, state, or local government agency in accordance with preestablished licensure requirements. A license awards an individual legal permission to perform certain regulated tasks or occupations.

## M

**meets What Works Clearinghouse group design standards with reservations** is the middle possible rating for a group design study reviewed by the WWC. Studies receiving this rating provide a lower degree of confidence that an observed effect was caused by the intervention. Randomized controlled trials that are not as well implemented or have problems with attrition, along with strong quasi-experimental designs, may receive this rating.

**meets What Works Clearinghouse group design standards without reservations** is the highest possible rating for a group design study reviewed by the WWC. Studies receiving this rating provide the highest degree of confidence that an observed effect was caused by the intervention. Only well-implemented randomized controlled trials that do not have problems with attrition may receive this highest rating.

**meta-analysis** is a quantitative statistical analysis of several separate but similar experiments or studies in order to test the pooled data for statistical significance.

## N

**non-degree credential** include: certificates issued in recognition of the completion of a postsecondary course of study, which can be either for-credit or non-credit; industry certifications awarded by an industry body, business, or trade association for demonstration of skills, typically via examination, based on industry standards; occupational or professional licenses awarded by a state or federal agency for demonstration of skills in a specific occupation; and apprenticeship credentials awarded after completion of a structured educational and workplace program based on industry and occupational standards. Emerging non-degree credentials include badging and microcredentialing. These credentials can be earned on the path to an Associates of Applied Associates degree.

## O

**outcome domain** is a group of closely-related outcomes. A domain is the organizing construct for a set of related outcomes through which studies claim effectiveness. For example, the WWC alphabetics domain within the Literacy topic includes the following outcomes: phonemic and phonological awareness, letter identification, print awareness, and phonics. In intervention reports and practice guides, the WWC assesses the rigor of evidence on the effectiveness of interventions within each domain identified in the review protocol. The intervention rating, improvement index, and extent of evidence are determined at the domain level.

## P

**prior learning assessment (PLA)** is a method of determining and awarding credit for the knowledge and skills a student gained through past work and life experience.

**proactive advising** refers to an advising model where advisers proactively and continuously engage students, with the goal of developing a caring and beneficial relationship that leads to students' increased academic motivation and persistence. Sometimes referred to as *intrusive advising*.

**program of study** is a structured sequence of academic and career and technical courses leading to a postsecondary-level credential.

## S

**self-paced learning** is any kind of instruction that proceeds based on the student's response and level of competence.

**stackable credentials** are credentials that can be accumulated over time and move a student/worker along a career pathway or up a career ladder.

## W

**work-based learning** refers to varying approaches to providing students with employment-relevant experiences as part of the training program. These approaches include internships, apprenticeships, visits to local employers, clinical placements, and job shadowing.

## Appendix A: Postscript From the Institute of Education Sciences

### What Is a Practice Guide?

The Institute of Education Sciences (IES) publishes practice guides to share coherent expert guidance addressing a particular educational challenge. Each recommendation in the practice guides is explicitly connected to supporting evidence from studies that meet What Works Clearinghouse™ (WWC) standards.

### How Are Practice Guides Developed?

To produce a practice guide, IES first selects a topic. Topic selection is informed by inquiries on the WWC website and requests sent to the WWC Help Desk, a limited literature search, and an assessment of the topic's evidence base. Next, working with a WWC contractor, IES selects a panel chair who has a national reputation and expertise in the topic, as well as additional panelists to co-author the guide. Panelists are selected based on their expertise in the topic area and the belief that they can work together to develop relevant, evidence-based recommendations. Panels include at least two current practitioners with expertise in the topic.

Relevant studies are identified through panel recommendations and a systematic literature search. These studies are then reviewed against the WWC design standards by certified reviewers who assess the internal validity of each study.<sup>130</sup> The panel synthesizes the evidence into recommendations. WWC staff summarize the research and draft the practice guide.

IES practice guides are then subjected to external peer review. This review is independent of the panel and the IES and WWC staff that supported the development of the guide. A critical task of the peer reviewers is to determine whether the evidence cited in support of particular recommendations is up-to-date and that studies of similar or better quality that point in a different direction have not been overlooked. Peer reviewers also evaluate whether the level of evidence category assigned to each recommendation is appropriate. WWC staff revise the guide to address concerns identified by the external peer reviewers and IES.

### Levels of Evidence for What Works Clearinghouse Practice Guides

The level of evidence represents the quality and quantity of existing research supporting each recommendation. The WWC and the panel assign each recommendation one of the following three levels of evidence: strong evidence, moderate evidence, and minimal evidence.

A *strong* level of evidence rating refers to consistent evidence that the recommended strategies, programs, or practices improve relevant outcomes for a diverse population of students.<sup>131</sup> In other words, this level of evidence indicates that there is strong causal and generalizable evidence to support the panel's recommendation.

A *moderate* level of evidence rating refers either to evidence from studies that allow strong causal conclusions but cannot be generalized with assurance to the population on which a recommendation is focused (perhaps because the findings have not been widely replicated), or to evidence from studies that are generalizable but have some causal ambiguity.

A *minimal* level of evidence rating suggests that the panel and the WWC cannot point to a body of evidence that demonstrates the practice’s positive effect on student outcomes. In some cases, this simply means that the recommended practices would be difficult to study in a rigorous, experimental or quasi-experimental fashion;<sup>132</sup> in other cases, it means that researchers have not yet studied this practice, or that there is weak or conflicting evidence of effectiveness. A minimal evidence rating does not indicate that the panel views the recommendation as any less important than other recommendations with a strong or moderate evidence rating.

To determine these levels of evidence, the WWC along with the panelists first conducts a careful review of the studies supporting each recommendation. For each recommendation, they examine the entire evidence base, taking into account the following considerations:

- Relevance of studies for representing the range of participants, settings, and comparisons on which the recommendation is focused.
- Whether findings from the studies can be attributed to the recommended practice.
- The weighted mean effect size from the fixed-effect meta-analysis for each relevant outcome domain.<sup>133</sup>
- The extent of evidence meeting WWC standards.<sup>134</sup>
- How well the studies represent the range of participants and settings relevant to the recommendation.
- The panel’s confidence in the effectiveness of the recommended practice.

In developing the levels of evidence, the panel and the WWC consider each of the criteria in Table A.1. The level of evidence rating for a recommendation is determined based on the findings for each of the criteria. For a recommendation to get a strong rating, the research must be rated as strong on each criterion. If at least one criterion receives a rating of moderate and none receives a rating of minimal, then the level of evidence for the recommendation is determined to be moderate. If one or more criteria receive a rating of minimal, then the level of evidence for the recommendation is determined to be minimal.

**Table A.1. IES levels of evidence for What Works Clearinghouse practice guides**

CRITERIA	STRONG Evidence Base	MODERATE Evidence Base	MINIMAL Evidence Base
Extent of evidence	The research includes studies that meet WWC standards and provide a “medium to large” extent of evidence. <sup>a</sup>	The research includes at least one study that meets WWC standards and provides a “small” extent of evidence. <sup>b</sup>	The research may include evidence from studies that do not meet the criteria for moderate or strong evidence.
Effects on relevant outcomes	The research shows, for the relevant outcome domain(s), a preponderance of evidence of “positive effects” without contradictory evidence of “negative effects” or “potentially negative effects.”	The research shows, for the relevant outcome domain(s), a preponderance of evidence of “positive effects” or “potentially positive effects.” Contradictory evidence of “negative effects” or “potentially negative effects” must be discussed and considered with regard to relevance to the scope of the guide and the intensity of the recommendation as a component of the intervention evaluated.	There may be weak or contradictory evidence of effects.

CRITERIA	STRONG Evidence Base	MODERATE Evidence Base	MINIMAL Evidence Base
Relevance to scope	The research has direct relevance to the scope—relevant context, sample, comparisons, and outcomes evaluated.	Relevance to scope may vary. At least some research is directly relevant to the scope.	The research may be out of the scope of the practice guide.
Relationship between research and the recommendations	The research includes a direct test of the recommendation or the recommendation is a major component of the interventions tested in the studies.	Intensity of the recommendation as a component of the interventions evaluated in the studies may vary.	Studies for which the intensity of the recommendation as a component of the interventions evaluated in the studies is low, and/or the recommendation reflects expert opinion based on reasonable extrapolations from research.
Panel confidence	The panel has a high degree of confidence that a given practice is effective.	<p>The panel determines that the research does not rise to the strong level of evidence but is more compelling than a minimal level of evidence.</p> <p>The panel may not be confident about whether the research has effectively controlled for other explanations or whether the practice would be effective in most or all contexts.</p>	In the panel's opinion, the recommendation must be addressed as part of the practice guide; however, the panel cannot point to a body of research that rises to the moderate or strong level of evidence.
Role of expert opinion	Not applicable.	Not applicable.	Expert opinion based on defensible interpretations of theory.
When assessment is the focus of the recommendation	For assessments, research meets the standards of <i>The Standards for Educational and Psychological Testing</i> . <sup>c</sup>	For assessments, research provides evidence of reliability that meets <i>The Standards for Educational and Psychological Testing</i> but with evidence of validity from samples not adequately representative of the population on which the recommendation is focused.	Not applicable.

Note: A recommendation must satisfy all applicable requirements in the same column for the WWC to characterize the practice as supported by the evidence base at that level.

<sup>a</sup> This includes randomized controlled trials (RCTs) and quasi-experimental design studies (QEDs) for this practice guide.

<sup>b</sup> The research may include studies generally meeting WWC group design standards and supporting the effectiveness of a program, practice, or approach with small sample sizes and/or other conditions of implementation or analysis that limit generalizability.

<sup>c</sup> American Educational Research Association, American Psychological Association, & National Council on Measurement in Education (1999)



## A Final Note About IES Practice Guides

Expert panels try to build a consensus, forging statements that all its members endorse. Practice guides do more than find common ground; they create a list of actionable recommendations. Where research clearly shows which practices are effective, the panelists use this evidence to guide their recommendations. However, in some cases, research does not provide a clear indication of what works. In these cases, the panelists' interpretation of the existing, but incomplete, evidence plays an important role in developing the recommendations.

## Appendix B: Methods and Processes for Developing This Practice Guide

### Phase 1: Selecting the Panel; Establishing a Review Protocol

**Expert Panel.** The WWC established a 6-member expert panel to advise on the development of the practice guide. The panel consisted of researchers who were at the forefront of career and technical education research and practitioners with experience in implementing career pathways interventions.

**Practice Guide Review Protocol.** The WWC worked with the expert panel to develop the practice guide review protocol, available at <https://ies.ed.gov/ncee/wwc/Document/1294>, which clarifies the practice guide’s purpose and scope. Five questions were identified to guide the literature search and the evidence review effort:

- Which CTE interventions are effective at helping students progress toward the completion of an industry-recognized credential (e.g., transition from adult basic education [ABE] or apprenticeship to postsecondary education)?
- Which CTE interventions are effective at helping students obtain an associate or a baccalaureate degree?<sup>135</sup>
- Which CTE interventions are effective at helping students obtain an industry-recognized credential, a license, or a certificate? Which CTE interventions are effective at helping students achieve technical skill proficiency?
- Which CTE interventions are effective at helping students obtain and/or retain employment?
- Which CTE interventions are effective at increasing earnings?

The time frame for the literature search was approximately 10 years, from January 1999 to May 2019. The eligible sample included participants in a postsecondary workforce development intervention in the United States. These participants must be 16 years or older and enrolled in a community college.<sup>136</sup> Eligible study designs included randomized controlled trials (RCTs) and quasi-experimental design studies (QEDs). Studies had to include a postsecondary workforce development intervention with a primary focus on developing the technical skills and knowledge required for specific jobs or fields of work. Only outcomes that fit into one of eleven outcome domains addressing postsecondary student educational and labor market outcomes were eligible for inclusion. The eleven domains were:

- |   |                           |
|---|---------------------------|
| 1. Credit accumulation  | 7. Medium-term employment |
| 2. Postsecondary degree attainment  | 8. Long-term employment   |
| 3. Attainment of a credential<br>(certification, license, or certificate) | 9. Short-term earnings    |
| 4. Academic performance   | 10. Medium-term earnings  |
| 5. Technical skill proficiency  | 11. Long-term earnings    |
| 6. Short-term employment  |                           |

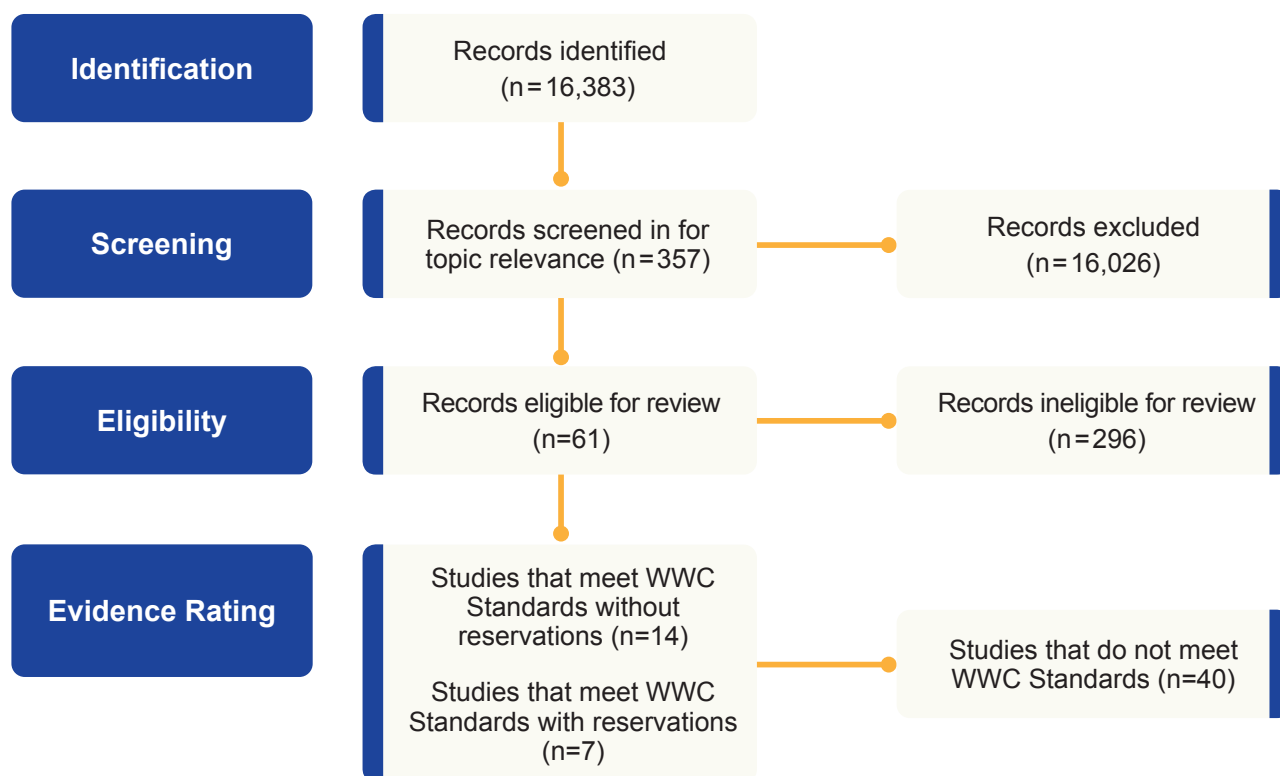
For additional details, the protocol can be accessed on the What Works Clearinghouse website.<sup>137</sup>

## Phase 2: Literature Search and Review

A targeted yet comprehensive search of electronic databases was conducted using keywords focused on eligible CTE intervention components, population, setting, study design, and outcomes. Panel members also recommended studies that could potentially contribute to the guide.

A total of more than 16,000 records were identified and screened using a multi-stage screening process to determine if they focused on CTE interventions and met the eligibility criteria detailed in the protocol (i.e., eligible CTE interventions, population, setting, study design, and outcomes). This screening process resulted in 61 eligible studies that were reviewed using WWC 4.0 group design standards.<sup>138</sup> For a study to meet WWC standards, at least one contrast must meet standards with or without reservations. See Figure B.1. for the number of records that went through the screening and eligibility process and the number of studies that were reviewed with the corresponding WWC evidence ratings.

**Figure B.1. Studies identified, screened, and reviewed for this practice guide**



Note: One record (Martinson et al., 2016) includes three studies that meet WWC Standards without reservations.

### Phase 3: Generating the Recommendations

WWC staff conducted a detailed examination of the studies that meet WWC standards to identify practices that played a role in each intervention. In conjunction with the WWC, the panel identified five recommendations that were grounded in evidence provided by the 21 studies that meet WWC standards. The panel then suggested ideas for carrying out the recommendations.

### Phase 4: Drafting the Practice Guide

WWC staff worked with the panel to further expand and clarify each recommendation and delineate how to implement each recommendation. WWC staff then used an iterative process to draft the recommendations, soliciting feedback from the panel and revising as needed at each stage. WWC staff also compiled the level of evidence for each recommendation and drafted the technical appendices. The practice guide underwent several rounds of review, including IES external peer review (as described in [Appendix A](#)).

## Appendix C: Rationale for Evidence Ratings

### Conducting Reviews of Eligible Studies

WWC-certified staff reviewed 21 studies to assess the quality of evidence supporting education programs and practices, using WWC group design standards version 4.0. The 21 studies that meet WWC standards provide the evidence for the recommendations. These studies are bolded in the endnotes and in the reference pages.

### Determining Relevance to Recommendations

Most of the 21 studies provide evidence for more than one recommendation, as the interventions in these studies include more than one practice (or component) for improving student outcomes. For example, one multi-component intervention might include career pathways (**Recommendation 1**), basic skills instruction (**Recommendation 2**), comprehensive student supports (**Recommendation 4**), and employment-focused partnerships (**Recommendation 5**), and thus be used as evidence for all four recommendations in this guide. The project staff determined which components were likely to cause an effect based on their prominence in the intervention program. Major intervention components in each study that meet standards were then assigned to the evidence base for the relevant recommendation. In Table C.1, the mapping between each study and the five recommendations is presented.

**Table C.1. Mapping between studies and recommendations**

Study	Recommendation				
	Career pathways	Basic skills instruction	Flexible delivery	Student supports	Employment partnerships
Anderson et al. (2017)	•	•		•	•
Bragg et al. (2018)					•
Cook et al. (2018)		•		•	
Curl et al. (2016)			•		
Dunham et al. (2016)	•				•
Fein & Beecroft (2006)			•	•	
Fein & Hamadyk (2018)	•				•
Gardiner et al. (2017)	•	•	•	•	
Glosser et al. (2018)	•	•		•	
Hamadyk & Zeidenberg (2018)	•	•	•	•	•
Martinson et al. (2018)	•	•	•	•	•
Martinson et al. (2016 - Grand Rapids Community College)	•			•	•
Martinson et al. (2016 - Kern Community College District)	•	•		•	•
Martinson et al. (2016 - North Central Texas College)				•	
Modicamore et al. (2017)	•	•		•	•



Study	Recommendation				
	Career pathways	Basic skills instruction	Flexible delivery	Student supports	Employment partnerships
Price et al. (2016)	•	•		•	
Price et al. (2017)				•	
Price et al. (2018)	•				•
Roder & Elliott (2018)				•	•
Rolston et al. (2017)				•	
Visher & Teres (2011)			•		

## Determining Relevant Outcomes

To simplify and focus the synthesis of evidence, the WWC worked with the panel to identify which outcome domains were relevant for each recommendation. The relevant domains for each recommendation are listed in Table C.2.

Some of the recommendations are aligned with educational or labor market outcomes only. Recommendation 1 is aligned with both educational and labor market outcomes, but Recommendations 2, 3, and 4 are aligned with educational outcomes only, and Recommendation 5 is aligned with labor market outcomes only. No studies that meet WWC standards included findings in either the long-term employment or long-term earnings domains.

The panel and staff considered only the findings in the predetermined relevant domains when determining the level of evidence for each recommendation. For brevity, only findings in relevant domains are presented in this appendix.

**Table C.2. Relevant domains for each recommendation**

Recommendation 1	Recommendations 2-4	Recommendation 5
<u>Education outcome domains</u> 1. Credit accumulation 2. Postsecondary degree attainment 3. Attainment of a credential (certification, license, or certificate) 4. Academic performance 5. Technical skill proficiency <u>Labor market outcome domains</u> 6. Short-term employment 7. Medium-term employment 8. Long-term employment 9. Short-term earnings 10. Medium-term earnings 11. Long-term earnings	<u>Education outcome domains</u> 1. Credit accumulation 2. Postsecondary degree attainment 3. Attainment of a credential (certification, license, or certificate) 4. Academic performance 5. Technical skill proficiency	<u>Labor market outcome domains</u> 6. Short-term employment 7. Medium-term employment 8. Long-term employment 9. Short-term earnings 10. Medium-term earnings 11. Long-term earnings

## Estimating Fixed-Effects Meta-Analytic Effect Sizes

As discussed in [Appendix A](#), the level of evidence determination for each recommendation relied on the extent of the evidence from the supporting studies. To synthesize the evidence across studies for each recommendation, the WWC calculated a weighted fixed-effects meta-analytic mean effect size for each relevant outcome domain in which at least two studies had findings.<sup>139</sup> This pooled estimate, which treats all of the studies contributing to that practice recommendation as a single study, means the WWC did not rely on a “vote counting” approach to assess evidence of positive effects on any relevant outcome. For domains in which only one study had findings, the study’s domain-level effect size was used in the level of evidence determination. To calculate the meta-analytic weight, studies were weighted by the inverse of the variance of each study’s effect size. Thus, large-scale studies received more weight than small-scale studies. The statistical significance of each effect size for each outcome domain was calculated using a *z*-test. For additional information on this process, see Appendix H of the WWC Version 4.1 Procedures Handbook.

To ensure that the resulting effect sizes were statistically independent, only one contrast from each study was included in the analysis.<sup>140</sup> In the case of multiple-contrast studies, only the findings from the contrast most relevant to the recommendation were included in the meta-analytic effect size calculation. Relevant contrasts that compared the effectiveness of two treatments were excluded from the meta-analysis.

For consistency, the meta-analytic effect size calculation for each domain is based on outcomes measured closest to the end of the intervention.<sup>141</sup> The effect sizes for each domain are listed in Tables [C.4](#), [C.6](#), [C.8](#), [C.10](#), and [C.12](#).

## Recommendation 1: Intentionally design and structure career pathways to enable students to further their education and enter and advance in employment.

### Rationale for Level of Evidence: *Moderate*

WWC staff and the expert panel assigned Recommendation 1 a *moderate* level of evidence, based on 12 studies of interventions with career pathways components. Eight of the studies<sup>142</sup> meet WWC group design standards without reservations, and the other four studies<sup>143</sup> meet WWC group design standards with reservations.

Across the 12 studies, there were findings in five outcome domains ([Table C.3](#)) even though all 11 outcome domains were relevant for this recommendation. Four domains had statistically significant, positive meta-analytic effect sizes: credit accumulation ( $g = 0.03$ ,  $p < 0.05$ ), industry-recognized credential attainment ( $g = 0.46$ ,  $p < 0.01$ ), short-term earnings ( $g = 0.35$ ,  $p < 0.01$ ), and short-term employment ( $g = 0.19$ ,  $p < 0.01$ ). One domain had a statistically significant, negative meta-analytic effect size: postsecondary degree attainment ( $g = -1.40$ ,  $p < 0.01$ ).

**Table C.3. Domain-level effect sizes across the 12 studies supporting Recommendation 1**

Domain	Number of studies	Effect size	95% Confidence interval	p Value
Credit accumulation	3	<b>0.03</b>	0.00, 0.05	< 0.05
Postsecondary degree attainment	2	<b>-1.40</b>	-1.57, -1.22	< 0.01
Industry-recognized credential attainment	9	<b>0.46</b>	0.44, 0.49	< 0.01
Short-term employment	6	<b>0.19</b>	0.14, 0.23	< 0.01
Short-term earnings	6	<b>0.35</b>	0.29, 0.40	< 0.01

Note: Significant findings are bolded. ns = nonsignificant findings. All effect sizes were calculated using a fixed effects meta-analytic effect size across studies. None of the 12 studies included findings that meet WWC standards in the following outcome domains: (1) academic performance; (2) technical skill proficiency; (3) medium-term employment; (4) long-term employment; (5) medium-term earnings; or (6) long-term earnings.

Evidence from all 12 studies provides a direct test of the recommendation, as career pathways are a major component of the interventions. In Martinson et al. (2018), the intervention included a sequenced pathway of occupational training and remediation of basic skills, followed by sequenced, college-level courses. In Hamadyk & Zeidenberg (2018), the intervention adapted and linked existing healthcare bridge programs into three 1-semester Patient Care Pathway academies. The intervention included a combination of occupational training and remediation of basic skills, following sequenced, ready-made courses. In Fein & Hamadyk (2018), the intervention supported participants in five pathways in the information technology and financial services sectors. In Martinson et al. (2016; Grand Rapids Community College and Kern Community College District), the interventions included a sequenced series of connected training courses linked to in-demand occupations and integrated occupational skills and basic skills instruction. In Gardiner et al. (2017), 16 existing programs were mapped into five pathways. In Price et al. (2016), colleges created new manufacturing pathways and modified existing pathways to enable participants to earn short-term credentials that stack toward one-year and two-year technical diplomas, and sometimes toward associate's degrees. In Glosser et al. (2018), the intervention offered entry-level coursework and certificates that were part of a structured career pathway and intended to lead to additional college-level education or training. In Anderson et al. (2017), there were 154 integrated career pathways programs that were credit-bearing and stackable. In Modicamore et al. (2017), the intervention offered accelerated, integrated basic skills, occupational skills, and job readiness training to prepare job seekers for high-demand occupations and further education. In Dunham et al. (2016), the intervention created career pathways in the shale oil and gas industry by expanding existing training options and developing stackable credential training programs. In Price et al. (2018), the colleges developed and enhanced healthcare career pathways.

The collection of studies demonstrate high external and moderate internal validity and a preponderance of positive impacts. In all of the studies supporting this recommendation, career pathways are a major component of the tested intervention. Therefore, the expert panel has assigned a moderate level of evidence to this recommendation. This rating is supported by the strength of the evidence according to the following criteria:

- Internal and External Validity of Supporting Evidence.** The average effect sizes for four of the five outcome domains (industry-recognized credential, credit accumulation, short-term earnings, and short-term employment) are positive and statistically significant, and each outcome domain average is based on more than one study with a total sample size above 350. However, the average effect sizes for the positive outcome domains are predominantly derived from studies that meet WWC group design standards with reservations.

- **Consistency of Effects on Relevant Outcomes.** The average effect size is statistically significant and negative for one of the five outcome domains (postsecondary degree attainment), but it is statistically significant and positive for the other four outcome domains (industry-recognized credential, postsecondary degree attainment, credit accumulation, short-term earnings, and short-term employment).
- **Relationship Between the Evidence and Recommendation.** In all 12 of the studies used to support Recommendation 1, career pathways are a major component of the tested intervention.

**Table C.4. Studies providing evidence for Recommendation 1: Intentionally design and structure career pathways to enable students to further their education, secure a job, and advance in employment**

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Anderson et al. (2017)</b>  <b>Additional source:</b> <b>Anderson et al. (2015)</b>  <i>QED</i>  <i>Meets WWC group design standards with reservations</i>	42,984 students  <i>average age: 28.3 years</i>	Community colleges and adult education settings in 4 states (IL, KS, KY, LA)	<u>Accelerating Opportunity (AO):</u> Community and technical colleges that were in the AO intervention condition developed or modified existing programs that offered career pathways for in-demand jobs. A major component of AO was integrated instruction, where both basic skills and CTE instructors taught the same class with at least 25 percent overlap. Students also received additional services, including advising, navigational, and financial supports, to help them progress through the program.  One relevant feature of this program was the use of an advisory board for career pathway development.	<u>Business-as-usual:</u> The comparison group students were drawn from the same recruitment sources (adult education, developmental education, or CTE) as the intervention group, but they did not have the opportunity to participate in AO.	Credit accumulation: $g = -0.03$  Industry-recognized credential attainment: $g = 0.49^*$  Short-term earnings: <sup>c</sup> Illinois participants earned \$125 more on average in a quarter than business-as-usual did. Louisiana participants earned \$194 more on average in a quarter than business-as-usual did  Short-term employment: $g = 0.09^*$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Dunham et al. (2016)</b>  <i>QED</i>  <i>Meets WWC group design standards with reservations</i>	353 students  <i>average age: 35.2 years</i> • 42.5% are older than 25 years	4 technical colleges in 3 states (PA, OH, TX)	<p><u>ShaleNET</u>: The intervention is a community-based job training program that offered stackable credential training programs in the oil and gas industry. Post-training internships and other work-based learning were sometimes offered. Support services included job search/ placement services and career counseling.</p> <p>One relevant feature of this program was the emphasis on identifying and assessing industry needs when designing the career pathways.</p>	<p><u>Workforce assistance</u>: The comparison group was drawn from the population of individuals from the surrounding counties who received assistance with finding employment from federally funded workforce programs in Pennsylvania during the same time period. It excluded all individuals who received any training.</p>	Short-term earnings: $g = 6.46^*$  Short-term employment: $g = 0.38^*$



Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Fein &amp; Hamadyk (2018)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	2,544 young adults (ages 16-24) <ul style="list-style-type: none"> <li>• 57.2% are 21 to 24</li> <li>• 42.8% are 18 to 20</li> </ul>	8 local offices that partner with community colleges (CA, DC, GA, IL, MA, NY, RI, WA)	<p><u>Year Up</u>: The intervention provided six months of tuition-free full-time training in IT and financial services followed by six months of an internship. Young adults participated in a cohort-learning experience that integrated occupational, general, and contextualized basic skills. Support services included one-on-one advising, tutoring, community mentorship, case management, counseling, financial supports, and employment support services.</p> <p>One relevant feature of this program was consulting and collaborating with employers and industry partners to review relevant labor market information as part of career pathway development. The program was also designed with an intake process assessing career aptitude and goals.</p>	<u>Business-as-usual</u> : Comparison group members could receive other training, education, and supports in the community.	Short-term earnings: $g = 1.00^*$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Gardiner et al. (2017)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	1,217 students  79% are 25 years or older <ul style="list-style-type: none"> <li>• 8.4% are 20 or younger</li> <li>• 13.0% are 21 to 24</li> <li>• 31.7% are 25 to 34</li> <li>• 46.9% are 35 or older</li> </ul>	1 community college and local workforce agency in Arizona	<b>Pathways to Healthcare:</b> The intervention offered occupational training programs in the healthcare industry. A 10-week basic skills “bridge class” was offered to participants who needed to increase their skills prior to starting a training program. The intervention also offered advising; scholarships for tuition, books, and program supplies; job assistance services; and peer support groups.  Relevant features of this program included clearly defined entry and exit points, a simplified and more accessible set of career pathways, and a comprehensive, holistic intake process.	<b>Business-as-usual:</b> The comparison group had access to services including standard assessment, basic skills education, occupational training programs, and support services (e.g., advising and tutoring), and employment services that are regularly available at the community college.	Credit accumulation: $g = -0.07$  Industry-recognized credential attainment: $g = 0.20^*$  Short-term earnings: $g = -0.03$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Glosser et al. (2018)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	631 students  <i>63% are 25 years or older</i> <ul style="list-style-type: none"> <li>• 22.2% are 20 or younger</li> <li>• 14.9% are 21 to 24</li> <li>• 29.8% are 25 to 34</li> <li>• 33.2% are 35 or older</li> </ul>	3 community colleges in Washington	<b>I-BEST:</b> The I-BEST intervention includes courses that are part of a structured pathway, team-teaching between basic skills instructors and occupational instructors, and reimbursement to the college for 1.75 FTE per student. This intervention also included dedicated academic advisors/case managers, career/college navigation services, and financial assistance for training-related costs and transportation.	<b>Business-as-usual:</b> Comparison group members could not access the I-BEST intervention and courses at the three colleges; however, they could access other education and training opportunities available to them, including non-I-BEST courses and the I-BEST intervention at other colleges. Both treatment and comparison group members could access general college advising, tutoring, financial aid services and job assistance services that were available to all students at the colleges.	Industry-recognized credential attainment: $g = 0.49^*$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Hamadyk &amp; Zeidenberg (2018)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	943 students  <i>69% are 25 years or older</i> <ul style="list-style-type: none"> <li>• 14.3% are 20 or younger</li> <li>• 16.4% are 21 to 24</li> <li>• 27.7% are 25 to 34</li> <li>• 41.6% are 35 or older</li> </ul>	1 community college in Iowa	<u>WTA Connect:</u> Students enrolled in tuition-free remedial and occupational certificate courses in healthcare, advanced manufacturing, and administrative support. Math and reading basic skills training was also offered. Support services included “achievement coaches” or advising support, transportation assistance, screening for public benefits, life skill workshops, and employment support services.	<u>Business-as-usual:</u> Students in the comparison group had access to standard courses and student support services, including standard basic skills remediation software and retest system to reapply to Des Moines Area Community College.	Industry-recognized credential attainment: <i>g = 0.25*</i>  Short-term earnings: <i>g = 0.03</i>

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Martinson et al. (2018)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	800 students  56% are 25 years or older • 17.9% are 20 or younger • 26.6% are 21 to 24 • 34.1% are 25 to 34 • 21.4% are 35 or older	Non-profit and community college partnership in Illinois	<u>Carreras en Salud</u> : Students enrolled in one or more one-semester healthcare academies that provided them with academic preparation, an accelerated path through remediation in occupational courses, and integrated basic skills and remediation courses. Support services included one-on-one advising, financial support, childcare and transportation assistance, and employment support services.  One relevant feature of this program was the identification and assessment of industry needs when designing the career pathways, using an advisory board to inform career pathway development, designing pathways with clearly defined entry and exit points, and carefully assessing the scope and time needed for curriculum redevelopment.	<u>Business-as-usual</u> : Students in the comparison group had access to standard courses and services at Instituto or other local community colleges or institutions, including basic skills and occupational training classes, and standard financial aid assistance, employment, and advising services.	Industry-recognized credential attainment: $g = 0.60^*$  Short-term earnings: $g = -0.04$



Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Martinson et al. (2016)</b>  <b>Grand Rapids Community College</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	274 students  <i>average age: 40.4 years</i> <ul style="list-style-type: none"> <li>• 5.4% are 21 or younger</li> <li>• 14.1% are 22 to 29</li> <li>• 28.5% are 30 to 39</li> <li>• 52.0% are 40 or older</li> </ul>	1 community college in Michigan	<u>GRCC Pathways to Prosperity</u> : All Green Jobs-Health Care interventions included a sequenced series of connected training courses linked to in-demand occupations and integrated occupational skills and basic skills instruction. Supportive services included financial assistance, tutoring, advising, and employment support services. At Grand Rapids Community College, 8-week training courses were offered in green-related sectors. Basic skills training was provided to those who needed it before starting training.  Relevant features of this program included the use of an advisory board during career pathway development and a holistic intake process.	<u>Business-as-usual</u> : Across community college sites, comparison group members could not access the intervention's grant-funded services, but could access other similar services available in the community.	Postsecondary degree attainment: $g = 0.45^*$  Industry-recognized credential attainment: $g = 1.00^*$  Short-term employment: $g = 0.18$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Martinson et al. (2016)</b>  <b>Kern Community College District</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	816 students  <i>average age: 32.3 years</i> <ul style="list-style-type: none"> <li>• 19.2% are 21 or younger</li> <li>• 30.8% are 22 to 29</li> <li>• 24.8% are 30 to 39</li> <li>• 25.2% are 40 or older</li> </ul>	1 community college in California	<u>KCCD Clean Energy Center</u> : All Green Jobs-Health Care interventions included a sequenced series of connected training courses linked to in-demand occupations and integrated occupational skills and basic skills instruction. Supportive services included financial assistance, tutoring, advising, and employment support services. At Kern Community College District, all participants started with a 6-week foundational training that integrated occupational training, basic skills, and employment support services.  Relevant features of this program included the use of an advisory board during career pathway development, a core curriculum that applies across multiple sectors, and a holistic intake process.	<u>Business-as-usual</u> : Across community college sites, comparison group members could not access the intervention's grant-funded services, but could access other similar services available in the community.	Postsecondary degree attainment: $g = -2.24^*$  Industry-recognized credential attainment: $g = 1.39^*$  Short-term employment: $g = 0.14$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Modicamore et al. (2017)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	2,168 students  <i>average age: 35.5 years</i> • 78% are older than 25 years	9 sites across 4 different states (CT, GA, MD, TX)	<u>Accelerating Connections to Employment (ACE)</u> : The ACE provides training that integrates basic and vocational skills instruction. It also offers support services such as individual coaching, tutoring, financial assistance, and internship/job readiness and placement services.  Relevant features of this program included use of an advisory board during career pathway development, ongoing assessment to identify additional in-demand training, and a holistic intake process, emphasizing career aptitude and goals.	<u>Business-as-usual</u> : The comparison condition included access to any non-ACE services at the local workforce agency.	Industry-recognized credential attainment: $g = 0.45^*$  Short-term employment: $g = 0.27^*$  Short-term earnings: $g = 0.02$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Price et al. (2018)</b>  <b>QED</b>  <i>Meets WWC group design standards with reservations</i>	3,376 students  <i>average age: 28.5</i> <ul style="list-style-type: none"> <li>• 49% are 25 or younger</li> <li>• 51% are 25 years or older</li> </ul>	14 community colleges in Wisconsin	<u>ACT for Healthcare:</u> Students enrolled in a TAACCT funded-healthcare program and received at least one-grant funded support service. The support services offered at each college varied, but could include embedded in-class academic supports, out of class academic supports such as one to one tutoring, and non-academic supports such as life skills training, counseling, and employment support services.  Relevant features included identifying and assessing industry needs as part of career pathway development and designing short-term, targeted credentials within parent programs.	<u>Matched business-as-usual:</u> Students in the comparison group were matched to the intervention group and were enrolled in other healthcare programs at the consortium colleges that were not supported by the TAACCT grant during the grant period. Both the intervention and comparison groups could access other supportive services not funded through the grant.	Short-term employment: $g = 0.20^*$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Price et al. (2016)</b>  <i>QED</i>  <i>Meets WWC group design standards with reservations</i>	6,300 students  <i>average age: 26.6 years for treatment group</i>	16 community colleges in Wisconsin	<u>Making the Future:</u> The intervention was meant to facilitate students' ability to earn short-term credentials, which typically takes less than 1 year, and "stack" toward 1-year and 2-year technical diplomas. The intervention included stacked and latticed manufacturing programs in welding, machine tool and computer numerical control (for 3D printing), and industrial maintenance. Support services varied depending on the college but included advising, counseling, and tutoring.  Relevant features included identifying and assessing industry needs and using an advisory board as part of career pathway development.	<u>Business-as-usual:</u> The comparison group students were enrolled in similar programs of study offered by the technical colleges and had access to typical courses, programs, and student support services.	Credit accumulation: $g = 0.19^*$  Industry-recognized credential attainment: $g = 0.35^*$

Note: Each row in this table represents a study, defined by the WWC as an examination of the effect of an intervention on a distinct sample.

<sup>a</sup> Sample size represents the maximum number of participants in the study. In some studies, the number of participants varied across the outcome measures.

<sup>b</sup> Effect sizes presented are from the outcome closest to the end of the intervention. For brevity, only the domain average effect size and statistical significance are reported in this table.

<sup>c</sup> There was insufficient information reported in Anderson et al. (2017) to generate effect sizes in the short-term earnings domain. In the table, coefficients from the analysis models are presented. The authors cited short-term earnings as statistically significant.

\* = statistically significant at the .05 level.



## Recommendation 2: Deliver contextualized or integrated basic skills instruction to accelerate students' entry into and successful completion of career pathways.

### Rationale for Level of Evidence: *Moderate*

WWC staff and the expert panel assigned Recommendation 2 a *moderate* level of evidence, based on nine studies of interventions that include contextualized or integrated basic skills instruction. Seven of the studies<sup>144</sup> meet WWC group design standards without reservations, and the other two studies<sup>145</sup> meet WWC group design standards with reservations.

Across the nine studies, there were findings in three outcome domains (Table C.5) even though all five educational outcome domains were relevant for this recommendation. Two domains had statistically significant, positive meta-analytic effect sizes: credit accumulation ( $g = 0.03$ ,  $p < 0.05$ ) and industry-recognized credential attainment ( $g = 0.45$ ,  $p < 0.01$ ). One domain had a statistically significant, negative meta-analytic effect size: postsecondary degree attainment ( $g = -2.24$ ,  $p < 0.01$ ).

**Table C.5. Domain-level effect sizes across the nine studies supporting Recommendation 2**

Domain	Number of studies	Effect size	95% Confidence interval	<i>p</i> Value
Credit accumulation	4	<b>0.03</b>	0.00, 0.05	< 0.05
Postsecondary degree attainment	1	<b>-2.24</b>	-2.45, -2.03	< 0.01
Industry-recognized credential attainment	9	<b>0.45</b>	0.43, 0.47	< 0.01

Note: Significant findings are bolded. ns = nonsignificant findings. All effect sizes were calculated using a fixed effects meta-analytic effect size across studies, except for the postsecondary degree attainment domain. This domain had findings from just one study; the effect size and *p* value presented here are the domain-level average effect size and *p* value for the individual relevant study. None of the nine studies included findings that meet WWC standards in the following outcome domains: (1) academic performance; or (2) technical skill proficiency.

Evidence from eight of the nine studies provides an indirect test of the recommendation, as contextualized or integrated basic skills instruction is a major or secondary component of the interventions. In Martinson et al. (2018) and Hamadyk & Zeidenberg (2018), basic skills instruction was contextualized with occupational content. In Martinson et al. (2016, Kern Community College District), the training program provided instruction on workplace safety as well as basic math and electrical skills. In Cook et al. (2018), accelerated and contextualized basic skills instruction was provided that shortened the number of remediation courses to a single semester. In Price et al. (2016), some sites implemented adult education and basic skills courses to connect students to manufacturing programs. Some took additional measures and integrated coursework with basic skills instruction. In Glosser et al. (2018), the central feature of the intervention was integrated basic skills and vocational education. In Anderson et al. (2017), contextualized basic skills and vocational instruction were integrated and provided as team teaching. In Modicamore et al. (2017), contextualized learning was the foundation of the intervention, and as such the intervention co-taught basic skills and vocational training.

In one study, Gardiner et al. (2017), the contextualization of basic skills was not a big component of the intervention, which was more focused on further training and coordinated supports.

The collection of studies demonstrate high external and moderate internal validity and a preponderance of positive impacts. In eight of the nine studies supporting this recommendation, contextualized or integrated basic skills instruction is a major or secondary component of the tested intervention. Therefore, the expert panel has assigned a *moderate* level of evidence to this recommendation. This rating is supported by the strength of the evidence according to the following criteria:

- **Internal and External Validity of Supporting Evidence.** The average effect sizes for two of the three educational outcome domains (credit accumulation and industry-recognized credential) are positive and statistically significant, and each outcome domain average is based on more than one study with a total sample size above 350. However, the average effect sizes for the positive outcome domains are predominantly derived from studies that meet WWC group design standards with reservations.
- **Consistency of Effects on Relevant Outcomes.** The average effect size is statistically significant and negative for one of the three educational outcome domains (postsecondary degree attainment), but it is statistically significant and positive for the other two educational outcome domains (credit accumulation and industry-recognized credential).
- **Relationship Between the Evidence and Recommendation.** In eight of the nine studies used to support Recommendation 2, contextualized or integrated basic skills instruction is a major or secondary component of the tested intervention.

**Table C.6. Studies providing evidence for Recommendation 2: Deliver contextualized or integrated basic skills instruction to accelerate students' entry into and successful completion of career pathways**

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<p><b>Anderson et al. (2017)</b></p> <p><b>Additional source: Anderson et al. (2015)</b></p> <p><i>QED</i></p> <p><i>Meets WWC group design standards with reservations</i></p>	<p>42,984 students</p> <p><i>average age: 28.3 years</i></p>	Community colleges and adult education settings in 4 states (IL, KS, KY, LA)	<p><u>Accelerating Opportunity (AO)</u>: Community and technical colleges that were in the AO intervention condition developed or modified existing programs that offered career pathways for in-demand jobs. A major component of AO was integrated instruction, where both basic skills and CTE instructors taught the same class with at least 25 percent overlap. Students also received additional services, including advising, navigational, and financial supports, to help them progress through the program.</p> <p>Relevant features of this study included the different team teaching models used by basic skills and CTE instructors, as well as the use of braided funding to cover the costs of the program.</p>	<u>Business-as-usual</u> : The comparison group students were drawn from the same recruitment sources (adult education, developmental education, or CTE) as the intervention group, but they did not have the opportunity to participate in AO.	<p>Credit accumulation: <math>g = -0.03</math></p> <p>Industry-recognized credential attainment: <math>g = 0.49^*</math></p>

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Cook et al. (2018)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	500 students  <i>55 % are 25 years or older</i> <ul style="list-style-type: none"> <li>• 23.4% are 20 or younger</li> <li>• 21.2% are 21 to 24</li> <li>• 30.0% are 25 to 34</li> <li>• 25.4% are 35 or older</li> </ul>	1 community college in Wisconsin	<u>MATC Patient Care Pathway</u> : The Patient Care Pathway intervention adapted and linked existing healthcare bridge programs into three one-semester Patient Care Pathway academies that combined occupational training and basic skills remediation. Students were also provided with dedicated advisors.  A relevant feature of the program was the provision of extra instructional support in response to emergent student needs.	<u>Business-as-usual</u> : The comparison group participants had access to usual services, including regular courses, advising services, and other student support services.	Credit accumulation: $g = 0.10$  Industry-recognized credential attainment: $g = -0.08$
<b>Gardiner et al. (2017)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	1,217 students  <i>79% are 25 years or older</i> <ul style="list-style-type: none"> <li>• 8.4% are 20 or younger</li> <li>• 13.0% are 21 to 24</li> <li>• 31.7% are 25 to 34</li> <li>• 46.9% are 35 or older</li> </ul>	1 community college and local workforce agency in Arizona	<u>Pathways to Healthcare</u> : The intervention offered occupation training programs in the Healthcare Industry. A 10-week basic skills “bridge class” was offered to participants who needed to increase their skills prior to starting a training program. The intervention also offered advising, scholarships for tuition, books, and program supplies, job assistance services, and peer support groups.  One relevant feature of the program was the instructor-led study groups to provide additional student support.	<u>Business-as-usual</u> : The comparison group had access to services including standard assessment, basic skills education, occupational training programs, and support services (e.g., advising and tutoring), and employment services that are regularly available at the community college.	Credit accumulation: $g = -0.07$  Industry-recognized credential attainment: $g = 0.20^*$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Glosser et al. (2018)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	631 students  <i>63% are 25 years or older</i> <ul style="list-style-type: none"> <li>• 22.2% are 20 or younger</li> <li>• 14.9% are 21 to 24</li> <li>• 29.8% are 25 to 34</li> <li>• 33.2% are 35 or older</li> </ul>	3 community colleges in Washington	<p><u>I-BEST</u>: The I-BEST intervention includes courses that are part of a structured pathway, team-teaching between basic skills instructors and occupational instructors, and reimbursement to the college for 1.75 FTE per student. This intervention also included dedicated academic advisors/case managers, career/college navigation services, and financial assistance for training-related costs and transportation.</p> <p>Relevant features of this program included the use of different models of team teaching, monitoring and assessment strategies for the implementation of these, as well as extra supports for basic skills instruction.</p>	<u>Business-as-usual</u> : Comparison group members could not access the I-BEST intervention and courses at the three colleges; however, they could access other education and training opportunities available to them, including non-I-BEST courses and the I-BEST intervention at other colleges. Both treatment and comparison group members could access general college advising, tutoring, financial aid services and job assistance services that were available to all students at the colleges.	Industry-recognized credential attainment: $g = 0.49^*$



Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Hamadyk &amp; Zeidenberg (2018)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	943 students  <i>69% are 25 years or older</i> <ul style="list-style-type: none"> <li>• 14.3% are 20 or younger</li> <li>• 16.4% are 21 to 24</li> <li>• 27.7% are 25 to 34</li> <li>• 41.6% are 35 or older</li> </ul>	1 community college in Iowa	<u>WTA Connect:</u> Students enrolled in tuition-free remedial and occupational certificate courses in healthcare, advanced manufacturing, and administrative support. Math and reading basic skills training was also offered. Support services included “achievement coaches” or advising support, transportation assistance, screening for public benefits, life skills workshops, and employment support services.	<u>Business-as-usual:</u> Students in the comparison group had access to standard courses and student support services, including standard basic skills remediation software and retest system to reapply to Des Moines Area Community College.	Industry-recognized credential attainment: <i>g = 0.25*</i>

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Martinson et al. (2018)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	800 students  56% are 25 years or older • 17.9% are 20 or younger • 26.6% are 21 to 24 • 34.1% are 25 to 34 • 21.4% are 35 or older	Non-profit and community college partnership in Illinois	<u>Carreras en Salud:</u> Students enrolled in one or more one-semester healthcare academies that provided them with academic preparation, an accelerated path through remediation in occupational courses, and integrated basic skills and remediation courses. Support services included one-on-one advising, financial support, childcare and transportation assistance, and employment support services.  One relevant feature of this program was the use of a bridge to accelerate students' progression through remediation courses. Another relevant feature was the use of curriculum specialists to identify relevant topics and to provide instructor support for contextualized instruction.	<u>Business-as-usual:</u> Students in the comparison group had access to standard courses and services at Instituto or other local community colleges or institutions, including basic skill and occupational training classes, and standard financial aid assistance employment, and advising services.	Industry-recognized credential attainment: $g = 0.60^*$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Martinson et al. (2016)</b>  <b>Kern Community College District</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	816 students  <i>average age: 32.3 years</i> <ul style="list-style-type: none"> <li>• 19.2% are 21 or younger</li> <li>• 30.8% are 22 to 29</li> <li>• 24.8% are 30 to 39</li> <li>• 25.2% are 40 or older</li> </ul>	1 community college in California	<u>KCCD Clean Energy Center</u> : All GJ-HC interventions included a sequenced series of connected training courses linked to in-demand occupations and integrated occupational skills and basic skills instruction. Supportive services included financial assistance, tutoring, advising, and employment support services. At KCCD, all participants started with a six-week foundational training that integrated occupational training, basic skills, and employment support services.	<u>Business-as-usual</u> : Across community college sites, comparison group members could not access the intervention's grant funded services, but could access other similar services available in the community.	Postsecondary degree attainment: $g = -2.24^*$  Industry-recognized credential attainment: $g = 1.39^*$
<b>Modicamore et al. (2017)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	2,168 students  <i>average age: 35.5 years</i> <ul style="list-style-type: none"> <li>• 78% are older than 25 years</li> </ul>	9 sites across 4 different states (CT, GA, MD, TX)	<u>Accelerating Connections to Employment (ACE)</u> : The ACE provides training that integrates basic and vocational skills instruction. It also offers support services such as individual coaching, tutoring, financial assistance, and internship/job readiness and placement services.  One relevant feature of this program was the use of team teaching to identify student challenges faster.	<u>Business-as-usual</u> : The comparison condition was business as usual which included access to any non-ACE services at the local workforce agency.	Industry-recognized credential attainment: $g = 0.45^*$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Price et al. (2016)</b>  <b>QED</b>  <i>Meets WWC group design standards with reservations</i>	6,300 students  <i>average age: 26.6 years for treatment group</i>	16 community colleges in Wisconsin	<b>Making the Future:</b> The intervention was meant to facilitate students' ability to earn short-term credentials, which typically can be earned in less than one year, and "stack" toward one-year and two-year technical diplomas. The intervention included stacked and latticed manufacturing programs in welding, machine tool and computer numerical control (CNC - i.e., for 3D printing), and industrial maintenance. Support services varied depending on the college but included advising, counseling, and tutoring.  Relevant features of this program included the use of intake assessments to inform the types of instruction needed, the use of bridges to accelerate student progression through remedial coursework, and the provision of extra supports to supplement basic skills instruction.	<b>Business-as-usual:</b> The comparison group students were enrolled in similar programs of study offered by the technical colleges and had access to typical courses, programs, and student support services.	Credit accumulation: $g = 0.19^*$  Industry-recognized credential attainment: $g = 0.35^*$

Note: Each row in this table represents a study, defined by the WWC as an examination of the effect of an intervention on a distinct sample.

<sup>a</sup> Sample size represents the maximum number of participants in the study. In some studies, the number of participants varied across the outcome measures.

<sup>b</sup> Effect sizes presented are from the outcome closest to the end of the intervention. For brevity, only the domain average effect size and statistical significance are reported in this table.

\* = statistically significant at the .05 level.

## Recommendation 3: Offer flexible instructional delivery schedules and models to improve credit accumulation and completion of non-degree credentials along career pathways.

### Rationale for Level of Evidence: *Minimal*

WWC staff and the expert panel assigned Recommendation 3 a *minimal* level of evidence, based on six studies of interventions that include flexible instructional delivery models. Five of the studies<sup>146</sup> meet WWC group design standards without reservations, and the other study<sup>147</sup> meets WWC group design standards with reservations. An additional four studies<sup>148</sup> include flexible instructional delivery models but do not report any educational outcomes.

Across the six studies, there were findings in all five educational outcome domains (Table C.7). Two domains had statistically significant, positive meta-analytic effect sizes: postsecondary degree attainment ( $g = 0.32$ ,  $p < 0.01$ ) and industry-recognized credential attainment ( $g = 0.33$ ,  $p < 0.01$ ). The other domains (credit accumulation, academic performance, and technical skill proficiency) did not have statistically significant meta-analytic effect sizes.

**Table C.7. Domain-level effect sizes across the six studies supporting Recommendation 3**

Domain	Number of studies	Effect size	95% Confidence interval	p Value
Credit accumulation	2	−0.04	−0.12, 0.05	ns
Postsecondary degree attainment	2	<b>0.32</b>	0.23, 0.41	< 0.01
Industry-recognized credential attainment	3	<b>0.33</b>	0.24, 0.41	< 0.01
Academic performance	1	0.06	−0.07, 0.19	ns
Technical skill proficiency	1	0.36	−0.04, 0.75	ns

Note: Significant findings are bolded. ns = nonsignificant findings. All effect sizes were calculated using a fixed effects meta-analytic effect size across studies, except for the academic performance and technical skill proficiency domains. These domains had findings from just one study; the effect sizes and  $p$  values presented here are the domain-level average effect sizes and  $p$  values for the individual relevant study. Across the six studies, there were findings in all five educational outcome domains.

Evidence from all six studies provides an indirect test of the recommendation, as flexible instructional delivery models are a secondary component of the interventions. In Martinson et al. (2018), the structure and content of the basic skills instruction accelerated remediation, flexible scheduling was offered, and tutoring was offered. In Hamadyk & Zeidenberg (2018), basic skills remediation courses were offered as self-paced, online courses that could be taken in an instructor-supervised lab or on their own. In Fein & Beecroft (2006), the intervention offered flexible scheduling, small class sizes, and self-paced courses. In Visser & Teres (2011), active and project-based learning strategies were used alongside flexible scheduling. In Curl et al. (2016), the intervention focused on high-fidelity simulations to supplement clinical experiences, which offered flexibility and efficiency in students' learning progression. In Gardiner et al. (2017), students chose the format of their basic skills program, either traditional format or a self-paced course, depending on their timeline and priorities.

The collection of studies demonstrate high external validity, low internal validity, and consistent positive impacts. In all of the studies supporting this recommendation, flexible instructional delivery

models are a secondary component of the tested intervention. Therefore, the expert panel has assigned a *minimal* level of evidence to this recommendation. This rating is supported by the strength of the evidence according to the following criteria:

- **Internal and External Validity of Supporting Evidence.** The average effect sizes for two of the five educational outcome domains (postsecondary degree attainment and industry-recognized credential) are positive and statistically significant, but the average effect sizes for the other three educational outcome domains (credit accumulation, academic performance, and technical skill proficiency) are indeterminate. Three of the five educational outcome domain averages are based on more than one study with a total sample size above 350.
- **Consistency of Effects on Relevant Outcomes.** The average effect size is not statistically significant and negative for any of the five educational outcome domains (credit accumulation, postsecondary degree, industry-recognized credential, academic performance, or technical skill proficiency).
- **Relationship Between the Evidence and Recommendation.** In all six of the studies used to support Recommendation 3, flexible instructional delivery models are a secondary component of the tested intervention.

**Table C.8. Studies providing evidence for Recommendation 3: Offer flexible instructional delivery schedules and models to improve credit accumulation and completion of non-degree credentials along career pathways**

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Curl et al. (2016)</b>  <i>QED</i>  <i>Meets WWC group design standards with reservations</i>	124 students  age is not reported in the study	2 community colleges and 1 public university in Texas	<b>Nursing STRIPES:</b> The intervention offered 20 four-hour simulation modules integrated into one-year or two-year Associate Degree of Nursing curriculums. Students also participated in an internship rotation throughout the intervention period.  High-fidelity simulations were a relevant feature of this intervention.	<b>Business-as-usual:</b> Comparison students were offered the intervention, but self-selected into the comparison group. They had access to traditional clinical learning experiences.	Technical skill proficiency: $g = 0.36$



Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Fein &amp; Beecroft (2006)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	1,043 students  age is not reported in the study	1 community college and 1 local county social services department in California	<p><u>New Visions</u>: Students participated in a 25-week training program that included basic skills remediation, occupational skills, life skills, and college prep courses. Students then participated in occupational training programs for at least 20 hours a week. Students were also provided support services.</p> <p>A relevant feature of this program was flexible course scheduling, including evening sessions, to accommodate students' varying work, childcare, and transportation needs.</p>	<u>Business-as-usual</u> : Students in the comparison group had access to courses and student support services at local educational institutions.	Credit accumulation: <sup>c</sup> earned 1.5 more credits on average than business-as-usual did  Postsecondary degree attainment: $g = 0.28$
<b>Gardiner et al. (2017)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	1,217 students  79% are 25 years or older • 8.4% are 20 or younger • 13.0% are 21 to 24 • 31.7% are 25 to 34 • 46.9% are 35 or older	1 community college and local workforce agency in Arizona	<p><u>Pathways to Healthcare</u>: The intervention offered occupation training programs in the Healthcare Industry. A 10-week basic skills “bridge class” was offered to participants who needed to increase their skills prior to starting a training program. The intervention also offered advising, scholarships for tuition, books, and program supplies, job assistance services, and peer support groups.</p> <p>A relevant feature of this program was the option for students to choose the format of their basic skills program, either traditional format or a self-paced course, depending on their timeline and priorities.</p>	<u>Business-as-usual</u> : The comparison group had access to services including standard assessment, basis skills education, occupational training programs, and support services (e.g., advising and tutoring), and employment services that are regularly available at the community college.	Credit accumulation: $g = -0.07$  Industry-recognized credential attainment: $g = 0.20^*$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Hamadyk &amp; Zeidenberg (2018)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	943 students  <i>69% are 25 years or older</i> <ul style="list-style-type: none"> <li>• 14.3% are 20 or younger</li> <li>• 16.4% are 21 to 24</li> <li>• 27.7% are 25 to 34</li> <li>• 41.6% are 35 or older</li> </ul>	1 community college in Iowa	<u>WTA Connect:</u> Students enrolled in tuition-free remedial and occupational certificate courses in healthcare, advanced manufacturing, and administrative support. Math and Reading basic skills training was also offered. Support services included “achievement coaches” or advising support, transportation assistance, screening for public benefits, life skill workshops, and employment support services.  A relevant feature of this program included self-paced, online basic skills remediation courses that students could choose to take in an instructor-supervised lab or on their own.	<u>Business-as-usual:</u> Students in the comparison group had access to standard courses and student support services, including standard basic skills remediation software and retest system to reapply to Des Moines Area Community College.	Industry-recognized credential attainment: $g = 0.25^*$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Martinson et al. (2018)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	800 students  56% are 25 years or older <ul style="list-style-type: none"> <li>• 17.9% are 20 or younger</li> <li>• 26.6% are 21 to 24</li> <li>• 34.1% are 25 to 34</li> <li>• 21.4% are 35 or older</li> </ul>	Non-profit and community college partnership in Illinois	<u>Carreras en Salud:</u> Students enrolled in one or more one-semester healthcare academies that provided them with academic preparation, an accelerated path through remediation in occupational courses, and integrated basic skills and remediation courses. Support services included one-on-one advising, financial support, childcare and transportation assistance, and employment support services.  A relevant feature of this program was evening courses to accommodate students who were employed while attending the program.	<u>Business-as-usual:</u> Students in the comparison group had access to standard courses and services at Instituto or other local community colleges or institutions, including basic skill and occupational training classes, and standard financial aid assistance employment, and advising services.	Industry-recognized credential attainment: $g = 0.60^*$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Visher &amp; Teres (2011)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	917 students  <i>15% are 25 years or older</i> <ul style="list-style-type: none"> <li>• 57.9% are 18 to 20</li> <li>• 27.6% are 21 to 25</li> <li>• 5.7% are 26 to 30</li> <li>• 8.9% are 31 or older</li> </ul>	1 community college in New York	<u>Career Focused Learning Communities:</u> The intervention consisted of linked three courses that focused on project-based learning and interdisciplinary teaching. The goal was to expose students to a specific major area of study and career options. Instructors spent a significant amount of time planning their courses, and were given the support to do so.  A relevant feature of this program was block scheduling, which reduced the amount of time students were required to be on campus.	<u>Business-as-usual:</u> Students in the control group had access to other courses and student support services at the college. KCC offers a high-quality college experience.	Credit accumulation: $g = 0.01$  Postsecondary degree attainment: $g = 0.38^*$  General academic achievement (college): $g = 0.06$

Note: Each row in this table represents a study, defined by the WWC as an examination of the effect of an intervention on a distinct sample.

<sup>a</sup> Sample size represents the maximum number of participants in the study. In some studies, the number of participants varied across the outcome measures.

<sup>b</sup> Effect sizes presented are from the outcome closest to the end of the intervention. For brevity, only the domain average effect size and statistical significance are reported in this table.

<sup>c</sup> There was insufficient information reported in Fein & Beecroft (2006) to generate effect sizes in the Credit Accumulation and domain. In the table, coefficients from the analysis models are presented. The authors cited this domain as statistically significant.

\* = statistically significant at the .05 level.

## Recommendation 4: Provide coordinated comprehensive student supports to improve credit accumulation and completion of non-degree credentials along career pathways.

### Rationale for Level of Evidence: *Moderate*

WWC staff and the expert panel assigned Recommendation 4 a *moderate* level of evidence, based on 15 studies of interventions that include comprehensive student supports. Of them, 12 studies<sup>149</sup> meet WWC group design standards without reservations, and the other three studies<sup>150</sup> meet WWC group design standards with reservations. An additional three studies<sup>151</sup> include comprehensive student supports but does not report any educational outcomes.

Across the 15 studies, there were findings in three outcome domains (**Table C.5**) even though all five educational outcome domains were relevant for this recommendation. Two domains had statistically significant, positive meta-analytic effect sizes: credit accumulation ( $g = 0.10$ ,  $p < 0.01$ ) and industry-recognized credential attainment ( $g = 0.48$ ,  $p < 0.01$ ). One domain had a statistically significant, negative meta-analytic effect size: postsecondary degree attainment ( $g = -0.12$ ,  $p < 0.01$ ).

**Table C.9. Domain-level effect sizes across the 15 studies supporting Recommendation 4**

Domain	Number of studies	Effect size	95% Confidence interval	p Value
Credit accumulation	6	<b>0.10</b>	0.07, 0.12	< 0.01
Postsecondary degree attainment	6	<b>-0.12</b>	-0.19, -0.06	< 0.01
Industry-recognized credential attainment	14	<b>0.48</b>	0.45, 0.50	< 0.01

Note: Significant findings are bolded. ns = nonsignificant findings. All effect sizes were calculated using a fixed effects meta-analytic effect size across studies. None of the 15 studies included findings that meet WWC standards in the following outcome domains: (1) academic performance; or (2) technical skill proficiency.

Evidence from 14 of the 15 studies provides a direct test of the recommendation, as comprehensive student supports are a major component of the interventions. In Martinson et al. (2018), students received one-on-one advising, childcare and transportation assistance, tuition assistance, and referrals to other resources and services. In Rolston et al. (2017), the intervention required weekly counseling sessions and offered substantial financial support. In Martinson et al. (2016; Grand Rapids Community College and Kern Community College District), supportive services included financial assistance, tutoring, advising, and job search assistance. In Martinson et al. (2016; North Central Texas College), supportive services included financial assistance, tutoring, advising, and job search assistance; however, only financial assistance services were tested in the study. In Fein & Beecroft (2006), the intervention offered intensive advising and counseling as well as a supportive learning community. In Gardiner et al. (2017), students were offered intensive/proactive advising, financial assistance, and employment services. In Cook et al. (2018), the intervention provided advising supports, among other services. In Price et al. (2016), the intervention provided intensive academic supports as well as enhanced non-academic support services to addresses personal issues. In Price et al. (2017), colleges provided comprehensive support services that addressed career, personal, and academic issues. In Glosser et al. (2018), students received advising and had access to significant financial supports, tutoring and other academic supports, and emergency childcare and transportation. In Anderson et al. (2017), students were offered comprehensive academic supports including tutoring,

academic and career advising, and case management services. In Modicamore et al. (2017), a career navigator provided individual academic and career advising as well as assistance finding other supports. In Roder & Elliott (2018), the intervention centered on providing comprehensive support services including remediation, financial support, one-on-one counseling, life skills workshops, and employment supports.

In one study (Hamadyk & Zeidenberg, 2018), there was limited uptake of the optional supportive services.

The collection of studies demonstrate high external and moderate internal validity and a preponderance of positive impacts. In 14 of the 15 studies supporting this recommendation, comprehensive student supports are a major component of the tested intervention. Therefore, the expert panel has assigned a *moderate* level of evidence to this recommendation. This rating is supported by the strength of the evidence according to the following criteria:

- **Internal and External Validity of Supporting Evidence.** The average effect sizes for two of the three educational outcome domains (credit accumulation and industry-recognized credential) are positive and statistically significant, and each outcome domain average is based on more than one study with a total sample size above 350. However, the average effect sizes for the positive outcome domains are predominantly derived from studies that meet WWC group design standards with reservations.
- **Consistency of Effects on Relevant Outcomes.** The average effect size is statistically significant and negative for one of the three educational outcome domains (postsecondary degree attainment), but it is statistically significant and positive for the other two educational outcome domains (credit accumulation and industry-recognized credential).
- **Relationship Between the Evidence and Recommendation.** In 14 of the 15 studies used to support Recommendation 4, comprehensive student supports are a major component of the tested intervention.



**Table C.10. Studies providing evidence for Recommendation 4: Provide coordinated comprehensive student supports to improve credit accumulation and completion of non-degree credentials along career pathways**

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<p><b>Anderson et al. (2017)</b></p> <p><b>Additional source: Anderson et al. (2015)</b></p> <p><i>QED</i></p> <p><i>Meets WWC group design standards with reservations</i></p>	<p>42,984 students</p> <p><i>average age: 28.3 years</i></p>	Community colleges and adult education settings in 4 states (IL, KS, KY, LA)	<p><u>Accelerating Opportunity (AO)</u>: Community and technical colleges that were in the AO intervention condition developed or modified existing programs that offered career pathways for in-demand jobs. A major component of AO was integrated instruction, where both basic skills and CTE instructors taught the same class with at least 25 percent overlap. Students also received additional services, including advising, navigational, and financial supports, to help them progress through the program.</p> <p>One relevant feature of this program was the use of career navigators to help students connect with student support services.</p>	<u>Business-as-usual</u> : The comparison group students were drawn from the same recruitment sources (adult education, developmental education, or CTE) as the intervention group, but they did not have the opportunity to participate in AO.	<p>Credit accumulation: <math>g = -0.03</math></p> <p>Industry-recognized credential attainment: <math>g = 0.49^*</math></p>

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Cook et al. (2018)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	500 students  <i>55% are 25 years or older</i> <ul style="list-style-type: none"> <li>• 23.4% are 20 or younger</li> <li>• 21.2% are 21 to 24</li> <li>• 30.0% are 25 to 34</li> <li>• 25.4% are 35 or older</li> </ul>	1 community college in Wisconsin	<u>MATC Patient Care Pathway</u> : The Patient Care Pathway intervention adapted and linked existing healthcare bridge programs into three one-semester Patient Care Pathway academies that combined occupational training and basic skills remediation. Students were also provided with dedicated advisors.  Relevant features of this program included instructors and staff coordinating their student support at critical transition points in the career pathway, as well as following up with students after program completion.	<u>Business-as-usual</u> : The comparison group participants had access to usual services, including regular courses, advising services, and other student support services.	Credit accumulation: $g = 0.10$  Industry-recognized credential attainment: $g = -0.08$
<b>Fein &amp; Beecroft (2006)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	1,043 students  age is not reported in the study	1 community college and 1 local county social services department in California	<u>New Visions</u> : Students participated in a 25-week training program that included basic skills remediation, occupational skills, life skills, and college prep courses. Students then participated in occupational training programs for at least 20 hours a week. Students were also provided support services.	<u>Business-as-usual</u> : Students in the comparison group had access to courses and student support services at local educational institutions.	Credit accumulation: <sup>c</sup> earned 1.5 more credits on average than business-as-usual did  Postsecondary degree attainment: $g = 0.28$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Gardiner et al. (2017)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	1,217 students  <i>79% are 25 years or older</i> <ul style="list-style-type: none"> <li>• 8.4% are 20 or younger</li> <li>• 13.0% are 21 to 24</li> <li>• 31.7% are 25 to 34</li> <li>• 46.9% are 35 or older</li> </ul>	1 community college and local workforce agency in Arizona	<u>Pathways to Healthcare:</u> The intervention offered occupation training programs in the Healthcare Industry. A 10-week basic skills “bridge class” was offered to participants who needed to increase their skills prior to starting a training program. The intervention also offered advising, scholarships for tuition, books, and program supplies, job assistance services, and peer support groups.	<u>Business-as-usual:</u> The comparison group had access to services including standard assessment, basis skills education, occupational training programs, and support services (e.g., advising and tutoring), and employment services that are regularly available at the community college.	Credit accumulation: $g = -0.07$  Industry-recognized credential attainment: $g = 0.20^*$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Glosser et al. (2018)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	631 students  <i>63% are 25 years or older</i> <ul style="list-style-type: none"> <li>• 22.2% are 20 or younger</li> <li>• 14.9% are 21 to 24</li> <li>• 29.8% are 25 to 34</li> <li>• 33.2% are 35 or older</li> </ul>	3 community colleges in Washington	<u>I-BEST</u> : The I-BEST intervention includes courses that are part of a structured pathway, team-teaching between basic skills instructors and occupational instructors, and reimbursement to the college for 1.75 FTE per student. This intervention also included dedicated academic advisors/case managers, career/college navigation services, and financial assistance for training-related costs and transportation.	<u>Business-as-usual</u> : Comparison group members could not access the I-BEST intervention and courses at the three colleges; however, they could access other education and training opportunities available to them, including non-I-BEST courses and the I-BEST intervention at other colleges. Both treatment and comparison group members could access general college advising, tutoring, financial aid services, and job assistance services that were available to all students at the colleges.	Industry-recognized credential attainment: $g = 0.49^*$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Hamadyk &amp; Zeidenberg (2018)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	943 students  <i>69% are 25 years or older</i> <ul style="list-style-type: none"> <li>• 14.3% are 20 or younger</li> <li>• 16.4% are 21 to 24</li> <li>• 27.7% are 25 to 34</li> <li>• 41.6% are 35 or older</li> </ul>	1 community college in Iowa	<u>WTA Connect:</u> Students enrolled in tuition-free remedial and occupational certificate courses in healthcare, advanced manufacturing, and administrative support. Math and Reading basic skills training was also offered. Support services included “achievement coaches” or advising support, transportation assistance, screening for public benefits, life skill workshops, and employment support services.	<u>Business-as-usual:</u> Students in the comparison group had access to standard courses and student support services, including standard basic skills remediation software and retest system to reapply to Des Moines Area Community College.	Industry-recognized credential attainment: <i>g = 0.25*</i>
<b>Martinson et al. (2018)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	800 students  <i>56% are 25 years or older</i> <ul style="list-style-type: none"> <li>• 17.9% are 20 or younger</li> <li>• 26.6% are 21 to 24</li> <li>• 34.1% are 25 to 34</li> <li>• 21.4% are 35 or older</li> </ul>	Non-profit and community college partnership in Illinois	<u>Carreras en Salud:</u> Students enrolled in one or more one-semester healthcare academies that provided them with academic preparation, an accelerated path through remediation in occupational courses, and integrated basic skills and remediation courses. Support services included one-on-one advising, financial support, childcare and transportation assistance, and employment support services.  One relevant feature of this program was the wraparound student support services.	<u>Business-as-usual:</u> Students in the comparison group had access to standard courses and services at Instituto or other local community colleges or institutions, including basic skill and occupational training classes, and standard financial aid assistance employment, and advising services.	Industry-recognized credential attainment: <i>g = 0.60*</i>

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Martinson et al. (2016)</b>  <b>Grand Rapids Community College</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	274 students  <i>average age: 40.4 years</i> <ul style="list-style-type: none"> <li>• 5.4% are 21 or younger</li> <li>• 14.1% are 22 to 29</li> <li>• 28.5% are 30 to 39</li> <li>• 52.0% are 40 or older</li> </ul>	1 community college in Michigan	<u>GRCC Pathways to Prosperity</u> : All GJ-HC interventions included a sequenced series of connected training courses linked to in-demand occupations and integrated occupational skills and basic skills instruction. Supportive services included financial assistance, tutoring, advising, and employment support services. At GRCC, 8-week training courses were offered in green-related sectors. Basic skills training was provided to those who needed them before starting training.	<u>Business-as-usual</u> : Across community college sites, comparison group members could not access the intervention's grant funded services, but could access other similar services available in the community.	Postsecondary degree attainment: $g = 0.45^*$  Industry-recognized credential attainment: $g = 1.00^*$
<b>Martinson et al. (2016)</b>  <b>Kern Community College District</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	816 students  <i>average age: 32.3 years</i> <ul style="list-style-type: none"> <li>• 19.2% are 21 or younger</li> <li>• 30.8% are 22 to 29</li> <li>• 24.8% are 30 to 39</li> <li>• 25.2% are 40 or older</li> </ul>	1 community college in California	<u>KCCD Clean Energy Center</u> : All GJ-HC interventions included a sequenced series of connected training courses linked to in-demand occupations and integrated occupational skills and basic skills instruction. Supportive services included financial assistance, tutoring, advising, and employment support services. At KCCD, all participants started with a six-week foundational training that integrated occupational training, basic skills, and employment support services.	<u>Business-as-usual</u> : Across community college sites, comparison group members could not access the intervention's grant funded services, but could access other similar services available in the community.	Postsecondary degree attainment: $g = -2.24^*$  Industry-recognized credential attainment: $g = 1.39^*$



Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Martinson et al. (2016)</b>  <b>North Central Texas College</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	984 students  <i>average age: 31.1 years</i> <ul style="list-style-type: none"> <li>• 28.6% are 21 or younger</li> <li>• 27.6% are 22 to 29</li> <li>• 17.9% are 30 to 39</li> <li>• 25.8% are 40 or older</li> </ul>	1 community college in Texas	<u>NCTC Health Matrix Grant scholarship program</u> : All GJ-HC interventions included a sequenced series of connected training courses linked to in-demand occupations and integrated occupational skills and basic skills instruction. Supportive services included financial assistance, tutoring, advising, and employment support services. NCTC focused on providing financial supports in the form of scholarships to its participants.	<u>Business-as-usual</u> : Across community college sites, comparison group members could not access the intervention's grant funded services, but could access other similar services available in the community.	Postsecondary degree attainment: $g = -0.08$  Industry-recognized credential attainment: $g = 0.50^*$
<b>Modicamore et al. (2017)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	2,168 students  <i>average age: 35.5 years</i> <ul style="list-style-type: none"> <li>• 78% are older than 25 years</li> </ul>	9 sites across 4 different states (CT, GA, MD, TX)	<u>Accelerating Connections to Employment (ACE)</u> : The ACE provides training that integrates basic and vocational skills instruction. It also offers support services such as individual coaching, tutoring, financial assistance, and internship/job readiness and placement services.  Relevant features of this program included wraparound services for students, including both academic and non-academic supports, as well as career coordinators, supporting students with career planning and transition.	<u>Business-as-usual</u> : The comparison condition was business as usual which included access to any non-ACE services at the local workforce agency.	Industry-recognized credential attainment: $g = 0.45^*$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Price et al. (2017)</b>  <i>QED</i>  <i>Meets WWC group design standards with reservations</i>	1,396 students  <i>average age: 31 years</i> • 58% are 25 years or older	Collaboration of community colleges, industry groups, and workforce agencies in 4 states (CT, MA, NH, NY)	<p><u>Northeast Resiliency Consortium</u>: The consortium created 44 continuing education to credit pathway and 40 credentials that stack to associate degrees. Enhanced support services included job search and placement assistance, counseling, tutoring, and connected referrals to other supports. Employer partnerships also provided work-based learning opportunities and internships.</p> <p>Relevant features of this program included career counselors delivering proactive, personalized one-on-one advising, integrating student supports in orientations and in-class activities, and facilitating weekly workshops on self-care and resiliency. Student success teams, consisting of instructors and student support staff, supported a more coordinated integrated delivery of student supports.</p>	<p><u>Matched business-as-usual</u>: The comparison group students were enrolled in similar programs of study offered by the technical colleges and had access to usual courses, programs, and student support services.</p>	Credit accumulation: $g = 0.61^*$  Industry-recognized credential attainment: $g = 0.80^*$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Price et al. (2016)</b>  <i>QED</i>  <i>Meets WWC group design standards with reservations</i>	6,300 students  <i>average age: 26.6 years for treatment group</i>	16 community colleges in Wisconsin	<p><u>Making the Future</u>: The intervention was meant to facilitate students' ability to earn short-term credentials, which typically can be earned in less than one year, and "stack" toward one-year and two-year technical diplomas. The intervention included stacked and latticed manufacturing programs in welding, machine tool and computer numerical control (CNC - i.e., for 3D printing), and industrial maintenance. Support services varied depending on the college but included advising, counseling, and tutoring.</p> <p>One relevant feature of this program was the career counselors supporting students with career planning and transition to further education and employment.</p>	<u>Business-as-usual</u> : The comparison group students were enrolled in similar programs of study offered by the technical colleges and had access to typical courses, programs, and student support services.	Credit accumulation: $g = 0.19^*$  Industry-recognized credential attainment: $g = 0.35^*$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Roder &amp; Elliott (2018)</b>  <b>Additional source:</b> <b>Roder &amp; Elliott (2019)</b> <b>Elliott &amp; Roder (2017)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	410 students  <i>71% are older than 25 years</i> <ul style="list-style-type: none"> <li>• 29.4% are 18 to 24</li> <li>• 44.9% are 25 to 34</li> <li>• 25.7% are 35 to 64</li> </ul>	2 community-based organizations in Texas	<p><b>Project QUEST:</b> The intervention provides comprehensive support services to ensure individuals complete occupational training courses at local community colleges and obtain employment. These support services include basic skills instruction in math and reading, college navigation and enrollment assistance, financial assistance for training, certification and related expenses, transportation reimbursement, counseling, referrals to welfare agencies, required peer support and life skills trainings, and job readiness/ placement services.</p> <p>Relevant features of this program included holistic approach to advising (combining academic and non-academic student supports), mandatory weekly group meetings with advisors, and embedding course attendance audits in these. The program used braided funding, combining public and private sector funds, to cover the program costs.</p>	<b>Business-as-usual:</b> The comparison condition could not receive QUEST services, but could enroll in the college and training on their own and seek other services in the community.	Postsecondary degree attainment: $g = -0.29^*$  Industry-recognized credential attainment: $g = 0.61^*$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Rolston, Copson, &amp; Gardiner (2017)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	958 students  <i>63% are 25 years or older</i> <ul style="list-style-type: none"> <li>• 14.1% are 20 or younger</li> <li>• 22.9% are 21 to 24</li> <li>• 40.6% are 25 to 34</li> <li>• 22.4% are 35 or older</li> </ul>	1 community-based organization in Texas	<p><u>VIDA Program</u>: The intervention required participants to enroll full-time in a certificate, associate's, or baccalaureate program. A 16-week basic skills class was offered to participants who needed to increase their skills prior to starting a training program. Support services included required case management and counseling sessions, and financial assistance.</p> <p>Relevant features of this program included a holistic approach to advising (combining academic and non-academic student supports), weekly group meetings with advisors to support group learning and foster peer support networks, and weekly course attendance audits (embedded in group meetings). The program costs were covered using braided funding, combining public and private sector funds.</p>	<u>Business-as-usual</u> : Students had access to usual course and student support services at local educational institutions.	Credit accumulation: <i>g = 0.35*</i>  Postsecondary degree attainment: <i>g = 0.14*</i>  Industry-recognized credential attainment: <i>g = 0.18*</i>

Note: Each row in this table represents a study, defined by the WWC as an examination of the effect of an intervention on a distinct sample.

<sup>a</sup> Sample size represents the maximum number of participants in the study. In some studies, the number of participants varied across the outcome measures.

<sup>b</sup> Effect sizes presented are from the outcome closest to the end of the intervention. For brevity, only the domain average effect size and statistical significance are reported in this table.

<sup>c</sup> There was insufficient information reported in Fein & Beecroft (2006) to generate effect sizes in the Credit Accumulation and domain. In the table, coefficients from the analysis models are presented. The authors cited this domain as statistically significant.

\* = statistically significant at the .05 level.

## Recommendation 5: Develop and continuously leverage partnerships to prepare students and advance their labor market success.

### Rationale for Level of Evidence: *Moderate*

WWC staff and the expert panel assigned Recommendation 5 a *moderate* level of evidence, based on 11 studies of interventions that include employment-focused partnerships. Seven of the studies<sup>152</sup> meet WWC group design standards without reservations, and the other four studies<sup>153</sup> meet WWC group design standards with reservations. An additional four studies<sup>154</sup> include employment-focused partnerships but do not report any labor market outcomes.

Across the 11 studies, there were findings in four outcome domains (**Table C.3**) even though all six labor market outcome domains were relevant for this recommendation. Three domains had statistically significant, positive meta-analytic effect sizes: short-term employment ( $g = 0.17, p < 0.01$ ), short-term earnings ( $g = 0.33, p < 0.01$ ), and medium-term earnings ( $g = 0.22, p < 0.05$ ). The other domain (medium-term employment) did not have a statistically significant meta-analytic effect size.

**Table C.11. Domain-level effect sizes across the 11 studies supporting Recommendation 5**

Domain	Number of studies	Effect size	95% Confidence interval	p Value
Short-term employment	8	<b>0.17</b>	0.13, 0.22	< 0.01
Medium-term employment	1	0.19	−0.02, 0.40	ns
Short-term earnings	7	<b>0.33</b>	0.28, 0.37	< 0.01
Medium-term earnings	1	<b>0.22</b>	0.01, 0.43	< 0.05

Note: Significant findings are bolded. ns = nonsignificant findings. All effect sizes were calculated using a fixed effects meta-analytic effect size across studies, except for the medium-term employment and medium-term earnings domains. These domains had findings from just one study; the effect sizes and  $p$  values presented here are the domain-level average effect sizes and  $p$  values for the individual relevant study. None of the 11 studies included findings that meet WWC standards in the following outcome domains: (1) long-term employment; or (2) long-term earnings.

Evidence from 10 of the 11 studies provides an indirect test of the recommendation, as employment-focused partnerships are a secondary component of the interventions. In Martinson et al. (2018), healthcare employers and staffing agencies participated in an advisory council that informed the curriculum and helped set up clinical internships. In Hamadyk & Zeidenberg (2018), the career readiness and training courses embedded employer-related activities, including visits to and from employers. In Fein & Hamadyk (2018), employers were involved in the intervention in many ways including providing feedback on the curriculum, teaching workshops, participating or hosting events, and offering paid internships. In Martinson et al. (2016; Kern Community College District), staff cultivated and maintained relationships with employers to provide feedback on the curriculum, participate in events, and hire program completers on occasion. In Bragg et al. (2018), grant funds were used to enhance existing program advisory committees, which included employer participants who reviewed the curriculum. In Anderson et al. (2017), all sites partnered with local labor market partners, mainly Workforce Investment Boards (WIBs), to connect employers with students or to create work-based learning opportunities. In Modicamore et al. (2017), the intervention involved partnerships among WIBs, community colleges, and industry partners that provided employment to program graduates. In Roder & Elliott (2018), community-based organizations partnered with area colleges, training providers, and employers. In Dunham et al. (2016), college partnerships with



industry groups, employers, and policymakers were a central element of the intervention. In Price et al. (2018), existing partnerships with employers and local workforce groups were expanded to cover a wide array of activities such as recruitment, work-based learning opportunities, and curriculum development.

One intervention was unable to continuously leverage partnerships. In Martinson et al. (2016, Grand Rapids Community College), employers were initially involved, but their role lessened over time.

The collection of studies demonstrate high external and moderate internal validity and consistent positive impacts. In 10 of the 11 studies supporting this recommendation, employment-focused partnerships are a secondary component of the tested intervention. Therefore, the expert panel has assigned a *moderate* level of evidence to this recommendation. This rating is supported by the strength of the evidence according to the following criteria:

- **Internal and External Validity of Supporting Evidence.** The average effect sizes for three of the four labor market outcome domains (short-term employment, short-term earnings, and medium-term earnings) are positive and statistically significant, and the outcome domain averages for short-term employment and short-term earnings are based on more than one study with a total sample size above 350. However, the average effect size for short-term employment is predominantly derived from studies that meet WWC group design standards with reservations, and the average effect size for medium-term earnings is based on one study.
- **Consistency of Effects on Relevant Outcomes.** The average effect size is not statistically significant and negative for any of the four labor market outcome domains (short-term employment, medium-term employment, short-term earnings, or medium-term earnings).
- **Relationship Between the Evidence and Recommendation.** In 10 of the 11 studies used to support Recommendation 5, employment-focused partnerships are a secondary component of the tested intervention.

**Table C.12. Studies providing evidence for Recommendation 5: Develop and continuously leverage partnerships to prepare students and advance their labor market success**

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Anderson et al. (2017)</b>  <b>Additional source:</b> <b>Anderson et al. (2015)</b>  <i>QED</i>  <i>Meets WWC group design standards with reservations</i>	42,984 students  <i>average age: 28.3 years</i>	Community colleges and adult education settings in 4 states (IL, KS, KY, LA)	<u>Accelerating Opportunity (AO)</u> : Community and technical colleges that were in the AO intervention condition developed or modified existing programs that offered career pathways for in-demand jobs. A major component of AO was integrated instruction, where both basic skills and CTE instructors taught the same class with at least 25 percent overlap. Students also received additional services, including advising, navigational, and financial supports, to help them progress through the program.	<u>Business-as-usual</u> : The comparison group students were drawn from the same recruitment sources (adult education, developmental education, or CTE) as the intervention group, but they did not have the opportunity to participate in AO.	Short-term employment: $g = 0.09^*$  Short-term earnings: <sup>c</sup> Illinois participants earned \$125 more on average in a quarter than business-as-usual did. Louisiana participants earned \$194 more on average in a quarter business-as-usual did.

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Bragg et al. (2018)</b>  <i>QED</i>  <i>Meets WWC group design standards with reservations</i>	1,448 students  <i>average age: 36 years</i> <i>77% are 25 years or older</i> <ul style="list-style-type: none"> <li>• 4.9% are 21 or younger</li> <li>• 18.2% are 21 to 25</li> <li>• 19.5% are 26 to 30</li> <li>• 25.6% are 31 to 40</li> <li>• 17.7% are 41 to 50</li> <li>• 13.8% are 50 or older</li> </ul>	1 community college in Utah	<u>School of Applied Technology and Technical Studies (SATTS)</u> : The intervention converted 24 certificate programs to competency based education (CBE) that were self-paced and self-directed. The intervention also enhanced student supports including academic advising and career/job assistance services.  One relevant feature of this program was an advisory committee with employers and industry partners, engaged in part through partner roundtables, to guide the career pathway design and development. The program also shared data to help employers see the value of the program.	<u>Matched business-as-usual</u> : The comparison group students were enrolled in similar programs of study (technology) offered at the community college and had access to college-wide student support services.	Short-term employment: $g = 0.20^*$  Short-term earnings: $g = 0.18^*$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Dunham et al. (2016)</b>  <i>QED</i>  <i>Meets WWC group design standards with reservations</i>	353 students  <i>average age: 35.2 years</i> • 42.5% are older than 25 years	4 technical colleges in 3 states (PA, OH, TX)	<p><u>ShaleNET</u>: The intervention is a community based job training program that offered stackable credential training programs in the oil and gas industry. Post-training internships and other work-based learning were sometimes offered. Support services included job search/ placement services and career counseling.</p> <p>One relevant feature of this program was an advisory committee with employers and industry partners to guide the design and development of the career pathways.</p>	<p><u>Workforce assistance</u>: The comparison group was drawn from the population of individuals from the surrounding counties who received assistance with finding employment from federally funded workforce programs in Pennsylvania during the same time period. It excluded all individuals who received any training.</p>	Short-term employment: $g = 0.38^*$  Short-term earnings: $g = 6.46^*$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Fein &amp; Hamadyk (2018)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	2,544 students  <ul style="list-style-type: none"> <li>• 57.2% are 21 to 24</li> <li>• 42.8% are 18 to 20</li> </ul>	8 local offices that partner with community colleges (CA, DC, GA, IL, MA, NY, RI, WA)	<p><u>Year Up</u>: The intervention provides six months of tuition-free full-time training in IT and financial services followed by six months of an internship. Young adults participated in a cohort-learning experience that integrate occupational, general, and contextualized basic skills contextualized. Support services included one-on-one advising, tutoring, community mentorship, case management, counseling, financial supports, and employment support services.</p> <p>Relevant features of this program included the strategic engagement of the advisory board to inform decision about the career pathways, using employer feedback for program improvement, facilitating work-based learning opportunities with employers, and a learn-and-earn model that allows for students to gain career-related work experiences.</p>	<u>Business-as-usual</u> : Comparison group members could receive other training, education, and supports in the community.	Short-term earnings: $g = 1.00^*$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Hamadyk &amp; Zeidenberg (2018)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	943 students  <i>69% are 25 years or older</i> <ul style="list-style-type: none"> <li>• 14.3% are 20 or younger</li> <li>• 16.4% are 21 to 24</li> <li>• 27.7% are 25 to 34</li> <li>• 41.6% are 35 or older</li> </ul>	1 community college in Iowa	<b>WTA Connect:</b> Students enrolled in tuition-free remedial and occupational certificate courses in healthcare, advanced manufacturing, and administrative support. Math and Reading basic skills training was also offered. Support services included “achievement coaches” or advising support, transportation assistance, screening for public benefits, life skill workshops, and employment support services.	<b>Business-as-usual:</b> Students in the comparison group had access to standard courses and student support services, including standard basic skills remediation software and retest system to reapply to Des Moines Area Community College.	Short-term earnings: $g = 0.03$
<b>Martinson et al. (2018)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	800 students  <i>56% are 25 years or older</i> <ul style="list-style-type: none"> <li>• 17.9% are 20 or younger</li> <li>• 26.6% are 21 to 24</li> <li>• 34.1% are 25 to 34</li> <li>• 21.4% are 35 or older</li> </ul>	Non-profit and community college partnership in Illinois	<b>Carreras en Salud:</b> Students enrolled in one or more one-semester healthcare academies that provided them with academic preparation, an accelerated path through remediation in occupational courses, and integrated basic skills and remediation courses. Support services included one-on-one advising, financial support, childcare and transportation assistance, and employment support services.  Relevant features of this program included an advisory committee with employers and industry partners, employers offering work-based learning opportunities, and using employer and student feedback for program improvement.	<b>Business-as-usual:</b> Students in the comparison group had access to standard courses and services at Instituto or other local community colleges or institutions, including basic skill and occupational training classes, and standard financial aid assistance employment, and advising services.	Short-term earnings: $g = -0.04$



Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Martinson et al. (2016)</b>  <b>Grand Rapids Community College</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	274 students  <i>average age: 40.4 years</i> <ul style="list-style-type: none"> <li>• 5.4% are 21 or younger</li> <li>• 14.1% are 22 to 29</li> <li>• 28.5% are 30 to 39</li> <li>• 52.0% are 40 or older</li> </ul>	1 community college in Michigan	<p><u>GRCC Pathways to Prosperity</u>: All GJ-HC interventions included a sequenced series of connected training courses linked to in-demand occupations and integrated occupational skills and basic skills instruction. Supportive services included financial assistance, tutoring, advising, and employment support services. At GRCC, 8-week training courses were offered in green-related sectors. Basic skills training was provided to those who needed them before starting training.</p> <p>Relevant features of this program included the career fairs and hiring events to facilitate student transition to employment.</p>	<u>Business-as-usual</u> : Across community college sites, comparison group members could not access the intervention's grant funded services, but could access other similar services available in the community.	Short-term employment: $g = 0.18$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Martinson et al. (2016)</b>  <b>Kern Community College District</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	816 students  <i>average age: 32.3 years</i> <ul style="list-style-type: none"> <li>• 19.2% are 21 or younger</li> <li>• 30.8% are 22 to 29</li> <li>• 24.8% are 30 to 39</li> <li>• 25.2% are 40 or older</li> </ul>	1 community college in California	<p><u>KCCD Clean Energy Center</u>: All GJ-HC interventions included a sequenced series of connected training courses linked to in-demand occupations and integrated occupational skills and basic skills instruction. Supportive services included financial assistance, tutoring, advising, and employment support services. At KCCD, all participants started with a six-week foundational training that integrated occupational training, basic skills, and employment support services.</p> <p>One relevant feature of this program was the strategic engagement of an advisory board with employers and industry partners. The program also included career fairs and hiring events to facilitate student transition to employment.</p>	<u>Business-as-usual</u> : Across community college sites, comparison group members could not access the intervention's grant funded services, but could access other similar services available in the community.	Short-term employment: $g = 0.14$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Modicamore et al. (2017)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	2,168 students  <i>average age: 35.5 years</i> <ul style="list-style-type: none"> <li>• 78% are older than 25 years</li> </ul>	9 sites across 4 different states (CT, GA, MD, TX)	<u>Accelerating Connections to Employment (ACE)</u> : The ACE provides training that integrates basic and vocational skills instruction. It also offers support services such as individual coaching, tutoring, financial assistance, and internship/job readiness and placement services.  Relevant features of this program included involving employers and industry partners in planning and design of the career pathways, using formal and informal feedback from students and employers for program improvement, facilitating work-based learning opportunities with employers, offering career fairs and hiring events, using a career navigator and a job developer to support post-program employment, and sharing data to help employers see the value of the program.	<u>Business-as-usual</u> : The comparison condition was business as usual which included access to any non-ACE services at the local workforce agency.	Short-term employment: $g = 0.27^*$  Short-term earnings: $g = 0.02$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Price et al. (2018)</b>  <b>QED</b>  <i>Meets WWC group design standards with reservations</i>	3,376 students  <i>average age: 28.5 years</i> <ul style="list-style-type: none"> <li>• 49% are under 25</li> <li>• 51% are 25 or older</li> </ul>	14 community colleges in Wisconsin	<u>ACT for Healthcare:</u> Students enrolled in a TAACCT funded-healthcare program and received at least one-grant funded support service. The support services offered at each college varied, but could include embedded in-class academic supports, out of class academic supports such as one to one tutoring, and non-academic supports such as life skills training, counseling, and employment support services.	<u>Matched business-as-usual:</u> Students in the comparison group were matched to the intervention group and were enrolled in other healthcare programs at the consortium colleges that were not supported by the TAACCT grant during the grant period. Both the intervention and comparison groups could access other supportive services not funded through the grant.	Short-term employment: $g = 0.20^*$

Study	Participants <sup>a</sup>	Setting	Intervention Condition	Comparison Condition	Outcome Domain and WWC Calculated Effect Size <sup>b</sup>
<b>Roder &amp; Elliott (2018)</b>  <b>Additional source:</b> <b>Roder &amp; Elliott (2019)</b> <b>Elliott &amp; Roder (2017)</b>  <i>RCT</i>  <i>Meets WWC group design standards without reservations</i>	410 students  <i>71% are older than 25 years</i> <ul style="list-style-type: none"> <li>• 29.4% are 18 to 24</li> <li>• 44.9% are 25 to 34</li> <li>• 25.7% are 35 to 64</li> </ul>	2 community-based organizations in Texas	<b>Project QUEST:</b> The intervention provides comprehensive support services to ensure individuals complete occupational training courses at local community colleges and obtain employment. These support services include basic skills instruction in math and reading, college navigation and enrollment assistance, financial assistance for training, certification and related expenses, transportation reimbursement, counseling, referrals to welfare agencies, required peer support and life skills trainings, and job readiness/ placement services.	<b>Business-as-usual:</b> The comparison condition could not receive QUEST services, but could enroll in the college and training on their own and seek other services in the community.	Short-term employment: $g = -0.17$  Short-term earnings: $g = 0.17$  Medium-term employment: $g = 0.19$  Medium-term earnings: $g = 0.22^*$

Note: Each row in this table represents a study, defined by the WWC as an examination of the effect of an intervention on a distinct sample.

<sup>a</sup> Sample size represents the maximum number of participants in the study. In some studies, the number of participants varied across the outcome measures.

<sup>b</sup> Effect sizes presented are from the outcome closest to the end of the intervention. For brevity, only the domain average effect size and statistical significance are reported in this table.

<sup>c</sup> There was insufficient information reported in Anderson et al. (2017) to generate effect sizes in the Short-term earnings domain. In the table, coefficients from the analysis models are presented. The authors cited Short-term earnings as statistically significant.

\* = statistically significant at the .05 level.

## Appendix D: About the Authors

### Panel

**Hope Cotner (Panel Chair)**, is President & CEO of the Center for Occupational Research and Development (CORD). CORD's initiatives include workforce analysis, career pathways design, curriculum development, leader and practitioner training, program delivery, technical assistance, and research and evaluation. Ms. Cotner has 29 years of experience guiding program improvement and providing technical assistance for career-technical and workforce education initiatives. She currently directs the Pathways to Credentials initiative for the U.S. Department of Education and Advancing Credentials Through Career Pathways on behalf of the ECMC Foundation. She serves as principal investigator of the Necessary Skills Now Network and co-principal investigator of Preparing Technicians for the Future of Work for the National Science Foundation's Advanced Technological Education program. She has led community college professional development efforts such as the North Carolina Network for Excellence in Teaching and the AT&T Academy for Community College Faculty. She has authored more than 20 professional development courses, toolkits, and guides and co-authored two books on career pathways. Ms. Cotner serves on the Board of Directors of the National Coalition of Advanced Technology Centers and was a career pathways subject matter expert for the President's Advanced Manufacturing Partnership 2.0 Steering Committee.

**Debra Bragg, PhD**, is Director of Community College Research Initiatives at the University of Washington in Seattle and also the Founding Director of the Office of Community College Research and Leadership at the University of Illinois at Urbana-Champaign, where she assumed the position as Endowed University Professor of Education Policy, Organization and Leadership. Dr. Bragg's research and evaluation work focuses on academic and career pathways, transitions and transfer from K-12 education to community colleges and universities, and employment. For many years, she was a researcher with the National Center for Research in Vocational Education, which later became the National Center for Career and Technical Education Research, directing national studies on career-technical education, tech prep, and career pathways. In recent years, Dr. Bragg has led research on Credit When It's Due (CWID) to document the implementation and impact of changes in transfer policy to confer associate's and baccalaureate degrees, including the ways high-performing transfer partnerships affect baccalaureate attainment rates for racially minoritized and low-income students. Her research portfolio also includes new funding to update a national landscape study on applied baccalaureate degrees conferred by community colleges. Dr. Bragg's work also extends beyond the United States; in 2012, she co-founded the International Pathways Collaborative, which brings together researchers studying career pathways in countries throughout the world.

**Grant Goold, EdD**, currently serves as Director of Pathway Development at Futuro Health. From 2017-2019, Dr. Goold served as a visiting CTE Faculty-Technical Assistance Provider within the California Community College Chancellors office. Dr. Goold also serves as the Program Director and Department Chair of EMS Education at American River College. He is in his 26th year teaching Career Technical Education courses for the Los Rios Community College District. Dr. Goold served on the Executive Committee of the Statewide Academic Senate (ASCCC) from 2015 to 2017. During his tenure at the ASCCCC, he was the inaugural chair of the Career Technical Education committee and chair of the Part-Time Faculty committee. Dr. Goold was actively involved in many projects concerning Career



Pathways, Curriculum Alignment, Strong Workforce and LaunchBoard. LaunchBoard is California's award winning data collection and analytics program. He has written several books related to prehospital emergency medicine and recently finished his latest textbook focusing on CTE student success.

**Eric Heiser, PhD**, is Provost of Central Ohio Technical College, where he oversees the Academic, Student Affairs, and Enrollment Management areas within the college. Dr. Heiser has worked in higher education for 15 years, the last six years at Salt Lake Community College (SLCC) as an Associate Dean and Dean. At SLCC, he built one of the nation's largest Competency-Based Education (CBE) Programs. The school transitioned 20 formerly non-credit, clock-hour programs into CBE. Dr. Heiser has advised numerous colleges in the areas of change management, competency-based education, and leading change through innovation. He serves as the Vice-Chairman of the Competency-Based Education Network (C-BEN) and is also a founding member of the National Advisory Board for Postsecondary Competency-Based Education and Learning Research. In addition to his work in CBE, Dr. Heiser also serves as Vice-President of the Board for the National Council of Instructional Administrators (NCIA), an affiliate council of the American Association of Community Colleges (AACC). Dr. Heiser has been a reviewer for the Northwest Commission on Colleges and Universities in the area of CBE. He has delivered numerous conference presentations on that topic over the past four years.

**Darlene G. Miller, EdD**, is Executive Director for the National Council for Workforce Education (NCWE). With more than 20 years of experience working in community colleges, Dr. Miller has extensive expertise in workforce and economic development. Previously she served as President of Manchester Community College (MCC) in New Hampshire. Dr. Miller also served as Vice President of Workforce and Economic Development at Shoreline Community College and as Executive Dean for Workforce Development at Green River Community College. She started in higher education as a faculty member at Vermont Technical College teaching mathematics, computer science, and engineering. In her role at NCWE, Dr. Miller is engaged in numerous national initiatives providing leadership coaching and technical assistance. She designed and procured funding for Building Community Partnerships to Serve Immigrant Workers, a Ford Foundation- and Annie E. Casey Foundation-funded project to bring together community colleges and community-based organizations and/or worker centers to develop education and training programs to help immigrant workers move into family-wage jobs. Dr. Miller has provided technical assistance and support for the development and implementation of prior learning assessment and the development of integrated career pathways on multiple TAACCCT grants. She also served on the leadership team for Accelerating Opportunity, a national initiative funded by the Gates, Joyce, Kellogg, Kresge, and Open Society Foundations, and provided technical assistance regarding the integration of career and technical education to all five states engaged in the initiative. Dr. Miller has also served on numerous local and national boards that support community colleges, workforce and economic development, workforce policy, and job training.

**Michelle Van Noy, PhD**, is Associate Director of the Education and Employment Research Center (EERC) at the School of Management and Labor Relations at Rutgers, the State University of New Jersey. In this role, Dr. Van Noy conducts research and evaluation in higher education and workforce development. She has particular expertise in community college workforce programs, including non-credit programs and technical education. Her research focuses on several issues including how institutions organize their programs to align with labor market needs and prepare students for the workforce, how students make choices about majors and careers and move through pathways from college to career, and how employers engage with education and use credentials in the hiring process.

Before joining EERC, Dr. Van Noy conducted research on community college workforce education at the Heldrich Center for Workforce Development at Rutgers and the Community College Research Center at Teachers College, Columbia University. She has experience conducting large-scale national evaluations in education and workforce development from her previous work at Mathematica Policy Research. Dr. Van Noy is well versed in the What Works Clearinghouse Standards and supported the development of the *Strategies for Postsecondary Students in Developmental Education* practice guide (NCEE 2017-4011) as a subcontractor to Development Services Group, Inc.

### Staff

The panel also would like to thank the Review Coordinators Ms. Hannah Engle and Ms. Yuhe Gu and the team of WWC-certified reviewers for their contributions to this practice guide.

**I-Fang Cheng, EdM**, is an Associate at Abt Associates and serves as the Deputy Project Director on the WWC Postsecondary Education, Postsecondary Preparation, and Evidence Reporting (PEPPER) contract. Ms. Cheng brings over 10 years of experience in education and workforce development research and technical assistance efforts. She has contributed to a number of projects related to helping youth and adults transition to postsecondary education or the workforce for the U.S. Departments of Education, Labor, and Health and Human Services, including the Study of College Transition Messaging in Gaining Early Awareness and Readiness for Undergraduate Programs (ED), Technical Assistance for States Developing Career Pathways (ED), Career Pathways Design Study (DOL), Evaluation of the Community College Consortium for Bioscience Credentials (DOL), and Next Generation of Health Profession Opportunity Grants (HHS). She is a former adult education instructor and program manager and K-12 classroom teacher. Ms. Cheng received her EdM in International Education Policy from the Harvard Graduate School of Education.

**Sarah Costelloe, PhD**, is a Principal Associate at Abt Associates and serves as the Project Director on the WWC Postsecondary Education, Postsecondary Preparation, and Evidence Reporting (PEPPER) contract. Dr. Costelloe has more than 15 years of experience in qualitative data collection, analysis, and interpretation and in working with stakeholders to design and implement evaluations of programs and policies funded at the district, state, and national levels. Outside of the WWC, Dr. Costelloe serves as the Project Director or Task Lead on projects related to early literacy, collective impact strategies, and research-practice partnerships. Prior to joining Abt Associates in 2015, Dr. Costelloe served as the Director of Research and Evaluation for the Philadelphia Youth Network and as a Research Scientist at the U.S. Department of Education. Dr. Costelloe received her PhD in Education Policy from the University of Pennsylvania.

**Brian Freeman, MEd**, is an Associate at Abt Associates and serves as Intervention Report Director on the WWC Postsecondary Education, Postsecondary Preparation, and Evidence Reporting (PEPPER) contract. Mr. Freeman has significant experience with project and task management; survey sampling, design, programming, and administration; data cleaning and documentation; and descriptive and statistical analysis for large-scale public sector studies. Outside of the WWC, Mr. Freeman has directed the analysis of more than a dozen surveys for the U.S. Department of Education, the Corporation for National and Community Service, the U.S. Department of Health and Human Services, and the National Science Foundation. He is also leading the evaluation of a school leadership intervention supported by an Education Innovation and Research (EIR) grant. Mr. Freeman received his MEd in Education Policy and Management from Harvard University.

**Sebastian Lemire, PhD**, is an Associate at Abt Associates and contributes to study reviews and synthesizing evidence on the WWC Postsecondary Education, Postsecondary Preparation, and Evidence Reporting (PEPPER) contract. Dr. Lemire brings over 15 years of experience managing research and evaluation projects for public and private sector organizations. His broad range of evaluation and applied studies covers the fields of education, market development, and social welfare in both national and international settings. Prior to joining Abt Associates, he worked as a Senior Evaluation Consultant at Ramboll Management and a Research Scientist at University of Washington. Dr. Lemire currently serves as Associate Editor of the *American Journal of Evaluation* and as advisory board member of *Evaluation*. Dr. Lemire earned his PhD in Social Research Methodology at UCLA.

**Shawn Moulton, PhD**, is a Senior Associate at Abt Associates and serves as the Practice Guide Screening Coordinator on the WWC Postsecondary Education, Postsecondary Preparation, and Evidence Reporting (PEPPER) contract. Dr. Moulton has expertise designing and directing quantitative analyses of social programs, as well as substantive expertise in education, housing, and workforce programs. He is currently the Director of Analysis for the U.S. Department of Housing and Urban Development's First-Time Homebuyer Education and Counseling Demonstration. He is a WWC-certified reviewer and has extensive experience providing technical assistance on evaluation plans and analyses. Dr. Moulton received his PhD in Economics from the University of Notre Dame.

**Allan Porowski, MPA**, is a Principal Associate at Abt Associates and serves as the Lead Methodologist on the WWC Postsecondary Education, Postsecondary Preparation, and Evidence Reporting (PEPPER) contract. Mr. Porowski has a wide range of experience in the design and conduct of rigorous research studies, as well as in research synthesis and dissemination. Mr. Porowski has been on the WWC team since 2003 and has served as a reviewer on a number of WWC topic review and practice guide review teams, including Math, Character Education, Out-of-School Time, and Foundational Reading. He currently serves as co-Lead Methodologist for the WWC Literacy review teams (Beginning Reading and Adolescent Literacy). In a previous position, he managed the WWC Help Desk and served as Project Coordinator on the Dropout Prevention topic review. Mr. Porowski has served as Principal Investigator on other systematic review efforts, including the Texas Best Practices Clearinghouse, a Texas Education Agency study of best practices in dropout prevention, and a review of child food security interventions for Feeding America. He also currently serves as Project Director of the Regional Educational Laboratories Program Design Research Project, and contributes to Abt's evaluation of the Investing in Innovation Fund (i3) program. Prior to joining Abt Associates in 2014, Mr. Porowski was a Fellow at ICF International. Mr. Porowski received his MPA from American University.

**Liz Yadav, MPP**, is an Analyst at Abt Associates and contributes to study reviews and synthesizing evidence on the WWC Postsecondary Education, Postsecondary Preparation, and Evidence Reporting (PEPPER) contract. Ms. Yadav has experience with collecting and analyzing quantitative and qualitative data, drafting data-oriented visual reports for public audiences, liaising with clients and research participants, and project management. Her other work includes contributing to other systematic review work, such as the Prevention Services Clearinghouse, and serving as Deputy Project Director on the Farm to School Census and Comprehensive Review and on an Education Innovation and Research (EIR) evaluation. Ms. Yadav received her MPP in Social Policy from Duke University.

## Appendix E: Disclosure of Potential Conflicts of Interest

Practice guide expert panels are composed of individuals who are nationally recognized for their knowledge and experience of the topics about which they are making recommendations. The Institute of Education Sciences expects the experts to be involved professionally in a variety of other matters that might relate to their work as a panelist. Panel members are asked to disclose these professional activities and institute deliberative processes that encourage critical examination of their views as they relate to the content of the practice guide. The potential influence of the panel members' professional activities is further muted by the requirement that they ground their recommendations in evidence that is documented in the practice guide. In addition, before all practice guides are published, they undergo an independent external peer review focusing on whether the evidence related to the recommendations in the guide has been presented appropriately.

The professional activities reported by each panel member that appear to be most closely associated with the panel recommendations are noted below.

**Hope Cotner** (Panel Chair) is the President and CEO of the Center for Occupational Research and Development (CORD). CORD created the *Contextual Teaching and Learning Toolkit* and the Employer Engagement Toolkit, which are referenced and featured as examples and resources in this practice guide.

**Dr. Debra Bragg** (Panelist) is Director of Community College Research Initiatives at the University of Washington in Seattle. She authored the evaluation of the Adult Competency-based Education Design (ACED) grant at Salt Lake Community College (Bragg et al., 2018) that was reviewed for this practice guide.

**Dr. Eric Heiser** (Panelist) is a former Dean of Salt Lake Community College and oversaw implementation of the Adult Competency-based Education Design (ACED) grant, which is featured in Bragg et al. (2018).

**Dr. Michelle Van Noy** (Panelist) is a co-author of the Wachen et al. (2010) study that informed Figure 1.1. She is also the lead author of the Van Noy et al. (2016) study on guided pathways that is cited under Recommendation 4.

This practice guide includes studies conducted by staff from **Abt Associates**,<sup>155</sup> some of whom are WWC reviewers. Studies conducted by Abt staff were reviewed by staff members from a different organization to avoid any potential conflict of interest.

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NOTE: Studies used to support a recommendation are indicated by **bold text** in the references.

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## Notes

<sup>1</sup> Carnevale et al. (2017).

<sup>2</sup> Carnevale et al. (2017).

<sup>3</sup> Sarna & Strawn (2018).

<sup>4</sup> This includes presidents, deans, program directors, and other administrators; technical faculty members and adult education program faculty; student affairs staff (including registrars and advisors); career center staff; and institutional effectiveness staff.

<sup>5</sup> <https://ies.ed.gov/ncee/wwc/Document/1294>

<sup>6</sup> Nine of the studies providing evidence for the recommendations in this practice guide reported the percentage of students age 25 or older. Of those, eight reported 56 to 79 percent of students fell into this category, and one reported only 15 percent of students did so. Eight additional studies reported average student age, and averages ranged from age 27 to 40. One study served only students age 16 to 24; of them, 57 percent were age 21 or older. Two studies did not report the ages of students served.

<sup>7</sup> Faculty requirements vary by state as well as by regional accrediting bodies. In some states, required faculty credentials can also vary for non-credit versus credit-bearing programs. For more information about the program at South Seattle College see <https://southseattle.edu/programs/professional-technical-education-instructional-design>.

<sup>8</sup> **Fein & Hamadyk (2018); Gardiner et al. (2017); Glosser et al. (2018); Hamadyk & Zeidenberg (2018); Martinson et al. (2016 - Grand Rapids Community College); Martinson et al. (2016 - Kern Community College District); Martinson et al. (2018); Modicamore et al. (2017).**

<sup>9</sup> **Anderson et al. (2017); Dunham et al. (2016); Price et al. (2016); Price et al. (2018).**

<sup>10</sup> **Bragg et al. (2018); Dunham et al. (2016); Martinson et al. (2018); Price et al. (2016); Price et al. (2018).**

<sup>11</sup> **Fein & Hamadyk (2018); Rolston et al. (2017).**

<sup>12</sup> *Understanding Your Community: Labor Market and Workforce Development System Data Toolkit* can be accessed at: <http://skilledwork.org/wp-content/uploads/2018/12/CSWLaborMarketReport-SinglePage-Jan-2019.pdf>.

<sup>13</sup> **Anderson et al. (2017); Bragg et al. (2018); Fein & Hamadyk (2018); Martinson et al. (2016); Martinson et al. (2018); Modicamore et al. (2017); Price et al. (2016).**

<sup>14</sup> **Modicamore et al. (2017).**

<sup>15</sup> **Gardiner et al. (2017); Martinson et al. (2018).**

<sup>16</sup> **Gardiner et al. (2017).**

- <sup>17</sup> Wisconsin's Nicolet Area Technical College offers a 16-credit short-term technical diploma in welding that recognizes a student completed the first semester of the one-year welding technical diploma program. Wisconsin Indianhead Technical College packaged five embedded technical diplomas within its one-year welding program. This allowed students the opportunity to learn one or more specific welding techniques that were identified as in demand by local employers; all these diplomas stack to a one-year welding technical diploma.
- <sup>18</sup> **Price et al. (2016).**
- <sup>19</sup> **Martinson et al. (2016).**
- <sup>20</sup> **Gardiner et al. (2017).**
- <sup>21</sup> **Cook et al. (2018).**
- <sup>22</sup> **Cook et al. (2018).**
- <sup>23</sup> For additional information on research and strategies for aligning non-credit and credit programs at community colleges, access The Education Strategy Group's *A More Unified Community College: Strategies and Resources to Align Non-Credit and Credit Programs*, available at [http://edstrategy.org/wp-content/uploads/2020/10/A-More-Unified-Community-College\\_FINAL.pdf](http://edstrategy.org/wp-content/uploads/2020/10/A-More-Unified-Community-College_FINAL.pdf).
- <sup>24</sup> **Martinson et al. (2018).**
- <sup>25</sup> See <https://facilitation.eku.edu/what-developing-curriculum-dacum> for additional detail and resources related to the DACUM process.
- <sup>26</sup> See <https://www.advancingcredentials.org/toolkit/downloads-developing/BILT-Toolkit-091019.pdf> for the BILT Toolkit for additional guidance on forming and implementing a BILT.
- <sup>27</sup> **Elliott & Roder (2017); Fein & Hamadyk (2018); Modicamore et al. (2017); Rolston et al. (2017).**
- <sup>28</sup> **Gardiner et al. (2017); Modicamore et al. (2017); Roder & Elliott (2018); Rolston et al. (2017).**
- <sup>29</sup> **Martinson et al. (2016).**
- <sup>30</sup> See Recommendation 5 for additional detail.
- <sup>31</sup> **Fein & Beecroft (2006).**
- <sup>32</sup> **Roder & Elliott (2019)** offer examples of how Project Quest offered students counseling to address personal and academic concerns and provide motivation and emotional support, along with weekly meetings that focus on life skills - such as time management, study skills, critical thinking, and conflict resolution - and coordinated referrals to multiple outside agencies for a host of supports.
- <sup>33</sup> North Central Texas College (featured in **Martinson et al., 2016**) covered up to 95 percent of tuition for non-credit programs, the cost of course materials and certification exam fees, and child care reimbursements up to 70 percent.
- <sup>34</sup> The University of Illinois's Office of Community College Research and Leadership offers several resources on strategies to improve policies, programs, and practices at community colleges and to support students' transition to college. See <https://occr.illinois.edu/> for more information.

- <sup>35</sup> From C. Mazzeo's *Supporting Student Success at California Community Colleges*, a 2008 white paper prepared for the Bay Area Workforce Funding Collaborative Career by the Career Ladders Project for California Community Colleges, p. 3 (quoted in Kalchik & Oertle, 2010).
- <sup>36</sup> Perin (2011).
- <sup>37</sup> Cook et al. (2018); Gardiner et al. (2017); Glosser et al. (2018); Hamadyk & Zeidenberg (2018); Martinson et al. (2016 - Kern Community College District); Martinson et al. (2018); Modicamore et al. (2017).
- <sup>38</sup> Anderson et al. (2017); Price et al. (2016).
- <sup>39</sup> For example, see the Center for Occupational Research and Development's *Contextual Teaching and Learning Toolkit* (<http://cordonline.net/CTLtoolkit/index.php>); Jobs for the Future's *Breaking Through Contextualization Toolkit* ([https://jfforg-prod-new.s3.amazonaws.com/media/documents/BT\\_toolkit\\_June7.pdf](https://jfforg-prod-new.s3.amazonaws.com/media/documents/BT_toolkit_June7.pdf)); and the Texas Education Agency-funded manual *Contextualizing Adult Education Instruction to Career Pathways* (<https://tcall.tamu.edu/docs/ContextualizingAdultEdInstructionCareerPathways.pdf>), which was jointly developed by Jobs for the Future, Literacywork International, and the Career Ladders Project.
- <sup>40</sup> Bragg et al. (2018); Price et al. (2016).
- <sup>41</sup> Price et al. (2018); Roder & Elliott (2018).
- <sup>42</sup> Cook et al. (2018).
- <sup>43</sup> Gardiner et al. (2017).
- <sup>44</sup> Martinson et al. (2018) and Price et al. (2016) offer examples.
- <sup>45</sup> Anderson et al. (2015), Anderson et al. (2017), and Glosser et al. (2018) offer examples.
- <sup>46</sup> Martinson et al. (2018).
- <sup>47</sup> Anderson et al. (2015); Anderson et al. (2017).
- <sup>48</sup> Glosser et al. (2018).
- <sup>49</sup> See the Washington State Board for Community and Technical Colleges's strategies, video and curricula samples for six team teaching models at: <https://www.sbctc.edu/colleges-staff/programs-services/i-best/team-teaching-models.aspx>. The Breaking Through Contextualization Toolkit, which provides guidance, strategies, and tools for developing and implementing contextualized education, can be accessed here: [https://jfforg-prod-new.s3.amazonaws.com/media/documents/BT\\_toolkit\\_June7.pdf](https://jfforg-prod-new.s3.amazonaws.com/media/documents/BT_toolkit_June7.pdf)
- <sup>50</sup> Glosser et al. (2018, p. v).
- <sup>51</sup> Modicamore et al. (2017).
- <sup>52</sup> Glosser et al. (2018).
- <sup>53</sup> Glosser et al. (2018); Price et al. (2016).



- <sup>54</sup> See <https://www.jff.org/resources/accelerating-opportunity-braided-funding-toolkit/> for tips and strategies.
- <sup>55</sup> See Recommendation 2 of the *Using Technology to Support Postsecondary Student Learning* practice guide for detailed suggestions (Dabbagh et al., 2019).
- <sup>56</sup> **Fein & Beecroft (2006); Gardiner et al. (2017); Hamadyk & Zeidenberg (2018); Martinson et al. (2018); Visher & Teres (2011).**
- <sup>57</sup> **Curl et al. (2016).**
- <sup>58</sup> **Bragg et al. (2018); Dunham et al. (2016); Price et al. (2018).**
- <sup>59</sup> **Gardiner et al. (2017); Hamadyk & Zeidenberg (2018); Martinson et al. (2018); Visher & Teres (2011).**
- <sup>60</sup> **Visher & Teres (2011).**
- <sup>61</sup> **Martinson et al. (2018).**
- <sup>62</sup> **Fein & Beecroft (2006).**
- <sup>63</sup> **Gardiner et al. (2017); Hamadyk & Zeidenberg (2018).**
- <sup>64</sup> For an example, see **Cook et al. (2018).**
- <sup>65</sup> See Recommendation 2 of the *Using Technology to Support Postsecondary Student Learning* practice guide (Dabbagh et al., 2019).
- <sup>66</sup> **Bragg et al. (2018)** offer an example.
- <sup>67</sup> See <https://www.educause.edu/research-and-publications/7-things-you-should-know-about>.
- <sup>68</sup> See <https://library.educause.edu/topics/teaching-and-learning/online-course-development-planning> and <https://library.educause.edu/topics/teaching-and-learning/online-teaching-strategies>.
- <sup>69</sup> **Cook et al. (2018).**
- <sup>70</sup> **Roder & Elliott (2018)** provide an example.
- <sup>71</sup> **Bragg et al. (2018); Price et al. (2016); Price et al. (2017).**
- <sup>72</sup> Salt Lake Community College (2014).
- <sup>73</sup> See [https://www.cbenetwork.org/wp-content/uploads/2018/09/1st\\_button\\_CBE17016\\_Quality\\_Framework\\_Update.pdf](https://www.cbenetwork.org/wp-content/uploads/2018/09/1st_button_CBE17016_Quality_Framework_Update.pdf) and [https://www.cbenetwork.org/wp-content/uploads/2018/09/2nd\\_button\\_Quality\\_Framework\\_Users\\_Guide\\_Final\\_.pdf](https://www.cbenetwork.org/wp-content/uploads/2018/09/2nd_button_Quality_Framework_Users_Guide_Final_.pdf)
- <sup>74</sup> Dabbagh et al. (2019), p. 21.
- <sup>75</sup> For an example see **Cook et al. (2018).**

- <sup>76</sup> Curl et al. (2016).
- <sup>77</sup> Roder & Elliott (2018).
- <sup>78</sup> Cook et al. (2018); Fein & Beecroft (2006); Gardiner et al. (2017); Glosser et al. (2018); Hamadyk & Zeidenberg (2018); Martinson et al. (2016 - Grand Rapids Community College, Kern Community College District, North Central Texas College); Martinson et al. (2018); Modicamore et al. (2017); Roder & Elliott (2018); Rolston et al. (2017).
- <sup>79</sup> Anderson et al. (2017); Price et al. (2016); Price et al. (2017).
- <sup>80</sup> Dunham et al. (2016).
- <sup>81</sup> Alliance for Quality Career Pathways (2014).
- <sup>82</sup> Community colleges might also wish to engage in process mapping to map students' journeys to and through a program and into employment. See <https://er.educause.edu/articles/2018/3/using-process-mapping-to-redesign-the-student-experience> for some resources for process mapping.
- <sup>83</sup> See Martinson et al. (2018) and Modicamore et al. (2017) for examples.
- <sup>84</sup> Elliott & Roder (2017); Fein & Hamadyk (2018); Modicamore et al. (2017); Rolston et al. (2017).
- <sup>85</sup> See <https://ccrc.tc.columbia.edu/media/k2/attachments/redesigning-community-college-onboarding-guided-pathways.pdf>. For additional information about how guided pathways approaches have been used to help community college career-technical programs structure student supports, see Van Noy et al. (2016).
- <sup>86</sup> Price et al. (2017).
- <sup>87</sup> Cook et al. (2018).
- <sup>88</sup> Cook et al. (2018).
- <sup>89</sup> Roder & Elliott (2018); Rolston et al. (2017).
- <sup>90</sup> See <https://www.hobsons.com/solution/starfish/>.
- <sup>91</sup> Several career navigator toolkits are available to assist community colleges in planning and implementing career navigation supports. For example, see: <http://www.collegetransition.org/wp-content/uploads/2017/10/NavigatorManual-July2015.pdf>; <https://internal.cccs.edu/wp-content/uploads/documents/CCNIRReferenceGuide.pdf>; <https://assets.aspeninstitute.org/content/uploads/2017/05/Annotated-Bibliography-Of-Resources-For-Navigators.pdf>; and <https://denveroy.org/career-navigator-toolkit/>.
- <sup>92</sup> Modicamore et al. (2017); Price et al. (2016).
- <sup>93</sup> Anderson et al. (2017).
- <sup>94</sup> Price et al. (2017).
- <sup>95</sup> Price et al. (2017).
- <sup>96</sup> Rolston et al. (2017).

<sup>97</sup> For an example see **Bragg et al. (2018)**.

<sup>98</sup> **Price et al. (2017)**.

<sup>99</sup> **Rolston et al. (2017)**.

<sup>100</sup> **Roder & Elliott (2018)**.

<sup>101</sup> **Price et al. (2017)**.

<sup>102</sup> **Roder & Elliott (2018); Rolston et al. (2017)**.

<sup>103</sup> **Roder & Elliott (2018)**.

<sup>104</sup> **Fein & Hamadyk (2018); Hamadyk & Zeidenberg (2018); Martinson et al. (2016 - Grand Rapids Community College, Kern Community College District); Martinson et al. (2018); Modicamore et al. (2017); Roder & Elliott (2018)**.

<sup>105</sup> **Anderson et al. (2017); Bragg et al. (2018); Dunham et al. (2016); Price et al. (2018)**.

<sup>106</sup> **Gardiner et al. (2017); Price et al. (2016); Price et al. (2017); Rolston et al. (2017)**.

<sup>107</sup> **Wilson (2015)**.

<sup>108</sup> **Bragg et al. (2018); Dunham et al. (2016); Martinson et al. (2018); Price et al. (2016); Price et al. (2017)**.

<sup>109</sup> **Fein & Hamadyk (2018); Martinson et al. (2016 - Kern Community College District, North Central Texas College)**.

<sup>110</sup> For an example see **Bragg et al. (2018)**.

<sup>111</sup> See <https://www.acteonline.org/professional-development/high-quality-cte-tools/business-and-community-partnerships/>.

<sup>112</sup> **Fein & Hamadyk (2018); Martinson et al. (2018); Modicamore et al. (2017); Price et al. (2016); Price et al. (2017)**.

<sup>113</sup> **Gardiner et al. (2017); Martinson et al. (2016); Modicamore et al. (2017); Price et al. (2016); Price et al. (2017)**.

<sup>114</sup> The Advancing Credentials initiative is led by the Center for Occupational Research and Development. The online *Employer Engagement Toolkit* also includes an employer engagement worksheet that a college can complete to track individual employers' current involvements with it and to identify future partnership opportunities. See <https://www.advancingcredentials.org/toolkit/developing-your-program-college-activities.php>.

<sup>115</sup> National Council for Workforce Education (n.d.) *Activating Business and Industry Partners and Improving Advisory Committees*.

<sup>116</sup> For an example see **Modicamore et al. (2017)**.

- <sup>117</sup> For more information on simulated work-based learning, see the National Center for Innovation in Career and Technical Education's strategies in the following resource: [https://www.gfcmsu.edu/revup/documents/SWBL\\_Report.pdf](https://www.gfcmsu.edu/revup/documents/SWBL_Report.pdf).
- <sup>118</sup> McFarland et al. (2019).
- <sup>119</sup> Gardner & Bartkus (2010).
- <sup>120</sup> **Fein & Hamadyk (2018).**
- <sup>121</sup> See **Gardiner et al. (2017)** for a discussion of challenges that may emerge when re-engaging students after they exit a career pathway.
- <sup>122</sup> **Fein & Hamadyk (2018); Martinson et al. (2018).**
- <sup>123</sup> **Martinson et al. (2018); Modicamore et al. (2017).**
- <sup>124</sup> See **Bragg et al. (2018)** for more information.
- <sup>125</sup> **Modicamore et al. (2017).**
- <sup>126</sup> See <https://cte.ed.gov/wbltoolkit/engaging.html>.
- <sup>127</sup> **Fein & Hamadyk (2018); Gardiner et al. (2017).**
- <sup>128</sup> **Bragg et al. (2018); Modicamore et al. (2017); Price et al. (2016).**
- <sup>129</sup> See Tool 1.7 in Job for the Future's *Employer Engagement Toolkit* for additional detail: <https://jfforg-prod-new.s3.amazonaws.com/media/documents/Employer-Engagement-Toolkit-092315.pdf>.
- <sup>130</sup> Study reviews occurred using the WWC Version 4.0 Standards Handbook, available at <https://ies.ed.gov/ncee/wwc/Handbooks>, and the version 4.0 practice guide review protocol available at <https://ies.ed.gov/ncee/wwc/Document/1294>.
- <sup>131</sup> Following WWC guidelines, improved outcomes are indicated by a positive, statistically significant effect from a meta-analytic effect size calculated separately for each relevant outcome domain. For more information on how the WWC calculates these effect sizes, see the WWC Version 4.1 Procedures Handbook at <https://ies.ed.gov/ncee/wwc/Handbooks>.
- <sup>132</sup> For more information, see the WWC Frequently Asked Questions page at <https://ies.ed.gov/ncee/wwc/FAQ>.
- <sup>133</sup> These findings are characterized as positive effects, potentially positive effects, uncertain effects, potentially negative effects, and negative effects. See Table IV.3 from the WWC Version 4.1 Procedures Handbook.
- <sup>134</sup> See Table IV.4 from the WWC Version 4.1 Procedures Handbook.
- <sup>135</sup> CTE interventions designed to support progression toward or completion of a graduate degree fall outside of the scope of these reviews. The reason is that graduate work will generally entail highly specialized training delivered to students who likely already have base credentials needed for middle-class employment and wages.

<sup>136</sup> If study interventions operate in multiple types of settings, at least 50% of the sample must be enrolled in community colleges for the study to be eligible. Alternatively, the study must include subgroup findings that focus on students enrolled in the community college sites.

<sup>137</sup> <https://ies.ed.gov/ncee/wwc/Document/1294>

<sup>138</sup> The updated *What Works Clearinghouse Standards and Procedures Handbook, Version 4.1* was publically available at the time of release of this practice guide. However, the reviews of studies that contributed to this practice guide's recommendations were conducted prior to that update. Therefore, the reviews for this practice guide were conducted under *Version 4.0*. Levels of evidence were assessed using a fixed-effects meta-analysis, following guidance in *Version 4.1*, however.

<sup>139</sup> The WWC chose the fixed-effects model because its goal is to make inferences about the studies in WWC intervention reports and practice guides. Unlike the fixed-effect (singular) model, the fixed-effects (plural) model does not assume that the studies are estimating a common effect. Instead, the fixed-effects model assumes that the observed variation among the effect sizes in the meta-analysis reflects the true variation in population effects. Accordingly, inferences to larger study populations are constrained to those that share the same patterns of important study characteristics that are related to effect size. See Hedges & Vevea (1998), *What Works Clearinghouse Standards and Procedures Handbook, Version 4.1*.

The WWC carefully weighed the various options for meta-analysis, including using random effects estimation. We determined that the fixed-effects modeling approach is currently the best option for the WWC, based on the available research. Implementing a random effects model requires estimating the between-studies variance component, and this estimate is poor unless the meta-analysis includes a relatively large number of studies. The fixed-effects approach allows the WWC to conceptually acknowledge variability in effects. As of January 2020, the largest synthesis conducted by the WWC was based on nine studies, and most WWC intervention reports are far smaller: two or three studies is typical. Therefore, we believe that for the foreseeable future, it is not practical for the WWC to adopt a random effects model for its syntheses. <https://ies.ed.gov/ncee/wwc/Docs/referenceresources/SumResponsePublicComments-v4-1-508.pdf>.

<sup>140</sup> If multiple contrasts from a study are entered into a meta-analysis, participants from experimental conditions that are common across contrasts will be counted twice, resulting in effect sizes that are statistically dependent. This dependence in a meta-analysis can create a serious threat to the validity of the results.

<sup>141</sup> For the labor market outcomes in the employment and earnings domains, the review considers short-, medium-, and long-term impacts as separate outcome domains. This yields a total of six domains for the Labor Market category. Short-term follow-up is defined as one to two years after earliest possible program completion; medium-term follow-up is defined as three to four years after earliest possible program completion; and long-term follow-up is defined as five or more years after earliest possible program completion. When a given labor market outcome is measured at different time points within the same outcome domain, the review prioritizes the measure with the shortest follow-up period.

<sup>142</sup> **Fein & Hamadyk (2018); Gardiner et al. (2017); Glosser et al. (2018); Hamadyk & Zeidenberg (2018); Martinson et al. (2016 - Grand Rapids Community College, Kern Community College District); Martinson et al. (2018); Modicamore et al. (2017).**

- <sup>143</sup> Anderson et al. (2017); Dunham et al. (2016); Price et al. (2016); Price et al. (2018).
- <sup>144</sup> Cook et al. (2018); Gardiner et al. (2017); Glosser et al. (2018); Hamadyk & Zeidenberg (2018); Martinson et al. (2016 - Kern Community College District); Martinson et al. (2018); Modicamore et al. (2017).
- <sup>145</sup> Anderson et al. (2017); Price et al. (2016).
- <sup>146</sup> Fein & Beecroft (2006); Gardiner et al. (2017); Hamadyk & Zeidenberg (2018); Martinson et al. (2018); Visser & Teres (2011).
- <sup>147</sup> Curl et al. (2016).
- <sup>148</sup> Bragg et al. (2018); Dunham et al. (2016); Fein & Hamadyk (2018); Price et al. (2018).
- <sup>149</sup> Cook et al. (2018); Fein & Beecroft (2006); Gardiner et al. (2017); Glosser et al. (2018); Hamadyk & Zeidenberg (2018); Martinson et al. (2016 - Grand Rapids Community College, Kern Community College District, North Central Texas College); Martinson et al. (2018); Modicamore et al. (2017); Roder & Elliott (2018); Rolston et al. (2017).
- <sup>150</sup> Anderson et al. (2017); Price et al. (2016); Price et al. (2017).
- <sup>151</sup> Dunham et al. (2016); Fein & Hamadyk (2018); Price et al. (2018).
- <sup>152</sup> Fein & Hamadyk (2018); Hamadyk & Zeidenberg (2018); Martinson et al. (2016 - Grand Rapids Community College, Kern Community College District); Martinson et al. (2018); Modicamore et al. (2017); Roder & Elliott (2018).
- <sup>153</sup> Anderson et al. (2017); Bragg et al. (2018); Dunham et al. (2016); Price et al. (2018).
- <sup>154</sup> Gardiner et al. (2017); Price et al. (2016); Price et al. (2017); Rolston et al. (2017).
- <sup>155</sup> Cook et al. (2018); Fein & Beecroft (2006); Fein & Hamadyk (2018); Gardiner et al. (2017); Glosser et al. (2018); Hamadyk & Zeidenberg (2018); Martinson et al. (2016 - Grand Rapids Community College, Kern Community College District, North Central Texas College); Martinson et al. (2018); Rolston et al. (2017).