Center on
GREAT TEACHERS & **LEADERS**
at American Institutes for Research

21st Century Educators

Developing and Supporting Great Career and Technical Education Teachers

AIR®
AMERICAN INSTITUTES FOR RESEARCH®

ACKNOWLEDGMENTS

Special Issues Brief

21st Century Educators

Developing and Supporting Great Career and Technical Education Teachers

Revised Edition

FEBRUARY 2014

Catherine Jacques
Amy Potemski

Contents

The Opportunity	The Challenge	The Approach
Career and technical education (CTE) teachers are uniquely positioned to support students and core academic teachers in implementing the Common Core State Standards.	State and federal education reforms in evaluation and support for teachers have paid insufficient attention to CTE teachers' valuable skills and specific professional learning needs.	State education agencies (SEAs) can collaborate with CTE stakeholders to develop a human capital management systems approach that aligns certification, evaluation, and professional learning policies specifically to support CTE teachers.

This Special Issues Brief from the Center on Great Teachers and Leaders (GTL Center) offers insight into three human capital management policies that are critical for career and technical education (CTE) teachers: **certification**, **performance evaluation**, and **professional development**.

CTE teachers are uniquely positioned to improve college and career readiness for all students, and yet major federal and state education reforms, such as the Common Core State Standards, teacher evaluation, and ESEA flexibility have paid insufficient attention to direct supports for CTE teachers. This brief is a first step in addressing these policy gaps by offering state education leaders an overview of the current policy landscape, its implications for CTE teacher effectiveness, and next steps for creating aligned and coherent human capital management policies. Specifically, this brief helps states do the following:

- Develop an understanding of the national policy landscape on certification, evaluation, and professional development for teachers in CTE fields.

- Review and assess current state policies for all teachers in addition to policies specific to CTE teachers so as to help (a) recruit and retain more CTE teachers, (b) improve CTE teacher effectiveness, and (c) properly support CTE teachers in implementing new standards such as the Common Core State Standards and the Common Career Technical Core.

- Recognize the importance of creating CTE human capital management policies that promote systems thinking rather than an "initiatives" approach. A systems mindset to improving educator effectiveness ensures greater coherence and comprehensiveness in addressing educators' needs, for both CTE teachers and educators overall.

The brief is intended for regional centers, SEA policymakers and staff (including state educator effectiveness leads and state directors of CTE), CTE advocacy groups, CTE professional organizations, and educator quality organizations. These stakeholders can build awareness about the importance of CTE in realizing federal and state policy priorities and work together to ensure that human capital management policies promote CTE teacher effectiveness.

Introduction

The 140,000 teachers of Career and Technical Education (CTE) at work today in American K–12 schools play a key role in preparing students to be ready for both college and career. For several decades, CTE policy has been evolving. No longer offering only traditional vocational education, the field now offers a diverse range of subjects and career fields, including a number of science, technology, engineering, and mathematics (STEM) subjects. In addition, the distinction between CTE and academic programs is slowly disintegrating as federal policies prioritize integrating academic content into CTE.

This recent policy evolution positions CTE teachers as an indispensable lever for improving students' college and career readiness. CTE teachers play a powerful role in preventing students from dropping out and providing a variety of opportunities for postsecondary success and employment, including pathways to a bachelor's degree. CTE also can help all students achieve the objectives of the Common Core through authentic, applied learning experiences. In short, CTE teachers are crucial change agents for the success of improving outcomes for all students.

Despite the overwhelming importance of CTE for college and career readiness, CTE teachers are often treated as an afterthought in reforms. Policymakers have paid insufficient attention to developing and supporting CTE teachers as part of wider human capital management reform efforts. CTE teachers, who enter the classroom with a wealth of technical knowledge and skill, often have little preparation in classroom instruction and need mentoring and professional learning opportunities to fill the gaps. Coupled with major shortages of CTE teachers nationwide, the present policy moment is a pivotal opportunity for the CTE field and SEAs to collaborate on improvements to certification, evaluation, and professional learning.

This Special Issues Brief offers a starting point and common foundation for this collaboration. State education leaders can support CTE teachers in promoting student learning outcomes by aligning CTE teacher policies as part of a human capital management system. A systems approach ensures that individual policies on certification, evaluation, professional learning, and other topics work together in a cohesive strategy for developing a highly effective teacher workforce. Working with CTE educators to align policies and reform efforts ensures that these changes make sense and are appropriate to their role as teachers. Most important, a systems approach helps ensure that all CTE teachers have the opportunity to grow as professionals and maximize their effectiveness in the classroom.

KEY ACTION STEPS FOR STATE POLICYMAKERS

State policymakers play a critical role in the success of CTE by crafting regulatory guidance and supporting districts' implementation of teacher effectiveness policies. Evaluating how these policies and this guidance affect CTE teachers and promote important outcomes, such as improvement in student learning, is a vital state agency role. State policymakers can work to ensure that existing human capital management policies incorporate the role of CTE teachers and recognize the pivotal role they play in students' college and career readiness. Specifically, state policymakers can do the following:

Review existing state human capital management policies in order to identify policy gaps for CTE teachers and ensure alignment with the state's broader vision of human capital management.

Collect and analyze statewide data about CTE teachers in order to prioritize key issues for the state, such as CTE teacher recruitment, and determine which policies may contribute to improvements in high-priority areas.

Include CTE administrators and teachers when designing or adjusting educator effectiveness policies and model systems to ensure that these policies and systems reflect the roles of CTE personnel.

Scan promising examples of high-quality CTE human capital management policies across states and districts to identify strategies for overcoming barriers to CTE teacher recruitment, retention, and effectiveness.

Provide districts with guidance and professional development to ensure that district-level human capital management policies and practices for CTE teachers are of high quality, aligned to the broader vision for human capital management in the state and district, and implemented with fidelity.

Ensure multiple and regular opportunities for feedback from CTE teachers and administrators by soliciting input from them about their work and about the resources and supports they need to be successful with their students.

A Pivotal Moment: Supporting CTE Teachers for College and Career Readiness Success

Who Are CTE Teachers?

CTE teachers make up a significant portion of the teaching workforce. Of the nearly 1 million middle and high school teachers nationwide, approximately 14 percent are CTE teachers (Bureau of Labor Statistics [BLS], 2013; National Center for Education Statistics [NCES], 2008; Walter & Gray, 2002).[1] Despite making up less than one fifth of all teachers, CTE teachers play a role in the education of the vast majority of secondary students: 94 percent of high school students will earn at least one CTE credit prior to graduation (Association for Career and Technical Education [ACTE], n.d.).

CTE teachers instruct in a number of fields and in a variety of settings. CTE teachers may work at the secondary level, postsecondary level, or both. This brief focuses on the policies affecting *secondary* CTE teachers. Secondary CTE teachers are certified classroom teachers at the middle school or high school level who teach in one of the many CTE-specific subjects, such as health sciences, veterinary science, engineering, computer programming, or business across the 16 Career Clusters (which were developed by the National Association of State Directors of Career Technical Education Consortium [NASDCTEc]; for more information, see the glossary). CTE teachers may teach secondary students in one or more settings, such as

- A typical classroom in a middle or high school

- A typical classroom at a "feeder" or magnet school to which students travel from other local schools expressly to attend CTE classes

- A typical classroom in a career academy within a high school

- A technical high school

- A CTE center, where high school students travel from other schools to attend CTE classes and may study alongside adult students

- A community or technical college setting as part of an early college program for secondary students

---

[1] This information was compiled from and cross-checked in multiple sources, but there may be discrepancies in the ways in which CTE teachers are identified. A CTE teacher may be identified as such through CTE course assignment, regardless of whether they teach other courses.

Understanding the Stakes: How CTE Teachers Position Students for College and Career Success

Graduation and Employment

In light of the national movement to implement college- and career-ready standards and initiatives, CTE teachers can play a critical role in ensuring that all students are college and career ready. CTE teachers can prevent high school dropout by engaging students in real-world learning opportunities and relevant, skill-based instruction; likewise, students who participate in CTE courses and programs are less likely to drop out of school. In fact, graduation rates for students in CTE programs are significantly higher than the graduation rate for high school students overall. Students in CTE programs have graduation rates of more than 90 percent, whereas the graduation rate for high school students overall is just under 75 percent (ACTE, n.d.). CTE teachers are positioned to ensure that students are well prepared for postsecondary success in the workforce, postsecondary education, or both.

Many programs of study within CTE prepare students for future careers by offering students opportunities for postsecondary success with or without a bachelor's degree. Employment projections predict that many of the jobs that will be added in the next decade will require some college or postsecondary certification. The same projections predict that far fewer jobs will be available for those with only a high school diploma or GED (Carnevale, Smith, & Strohl, 2010, 2013; U.S. Department of Education, 2012). CTE prepares students for future success in the workforce because it provides students with a diverse range of career opportunities. These career opportunities also are often part of a career pathway that provides opportunities for employment experience over time. For example, a high school CTE student may take courses in information technology that lead to one or more industry certifications in information technology. A student can then use those industry certifications to gain work experience in the information technology field while working toward an associate's degree and eventually, if desired, a higher degree. Because many careers—especially those in STEM fields—often require a bachelor's degree or higher (Rothwell, 2013), CTE provides students with diverse opportunities for work experience in these fields prior to earning a college degree. These opportunities can ensure that students graduate from high school prepared for both college and career.

> **STUDENTS IN CTE PROGRAMS** have graduation rates of more than 90 percent, whereas the graduation rate for high school students overall is just under 75 percent (ACTE, n.d.).

Common Core State Standards

Common Core State Standards implementation has major implications for instruction in all subjects, including CTE. The Common Core includes more rigorous language arts and mathematics standards as well as literacy standards for other disciplines, including science and technical subjects. The Common Core requires teachers to make several instructional shifts to help students meet the increased rigor of the standards, including applying literacy and mathematics skills to real-world contexts. CTE's connection to industry and focus on skill development uniquely positions CTE teachers to help students experience and master these skills in applied, real-world contexts. CTE teachers can collaborate with core content teachers or participate in integrated academic and CTE programs, such as career academies, to engage students in authentic learning experiences in a real-world context. By collaborating with core content teachers, CTE teachers can help all students—even those not enrolled in a CTE program—to learn through real-world application and meet the expectations of the Common Core (Kemple, 2008; Lombardi, 2007).

MANY CTE TEACHERS have had little teacher preparation coursework: about *75 percent* of CTE teachers take alternate certification routes instead of attending a traditional teacher preparation program.

Seizing the Opportunity: How Policymakers Can Support CTE Teacher Effectiveness

Supports for Integrating Academic Content in CTE

The Common Core requires teachers of subjects other than language arts, including both CTE and non-CTE teachers, to integrate literacy skills into instruction. This builds on the current requirement for CTE teachers to integrate academic content into instruction, which the 2006 reauthorization of the Carl D. Perkins Career and Technical Education Improvement Act ([Perkins Act], 2006) reemphasized. CTE teachers are well positioned to help all students achieve the objectives of the Common Core, but like all teachers, they need support in implementing the requirements of the Common Core and other policies. There have been many resources developed to support CTE teachers in integrating academic content in CTE coursework during the last decade, but effectively and meaningfully integrating academic content remains a challenge for many CTE teachers. One reason for this challenge is the way in which CTE teachers are prepared. Many CTE teachers have had little teacher preparation coursework: about 75 percent of CTE teachers take alternate certification routes instead of attending a traditional teacher preparation program (Bazile & Walter, 2009; Bottoms & McNally, 2005; National Research Center for Career and Technical Education [NRCCTE], 2011). Less rigorous alternative certification routes can leave CTE teachers underprepared to effectively integrate academic content into their courses.

Another factor is the "silo culture" that characterizes some school buildings, in which CTE instruction is seen as separate from core academic courses. A silo culture creates barriers for CTE teachers in collaborating with core academic teachers. This school culture is rarely addressed because few state-, district-, or school-level supports are available to CTE teachers who wish to establish collaborative relationships. CTE teachers typically must work to establish collaborative partnerships with core academic teachers on their own. Although some promising models for collaboration exist (see page 30 on Collaborative Teaching Models for more information), CTE teachers need targeted, intentional support in establishing meaningful partnerships with other teachers and effectively integrating academic and CTE content.

Supports to Implement the Common Career Technical Core

CTE teachers can expect further changes to instructional expectations as states adopt and implement the Common Career Technical Core. The Common Career Technical Core was collaboratively developed by NASDCTEc; 42 states, the District of Columbia, and Palau; and leadership from business and industry, K–12, and higher education. Like the Common Core, the Common Career Technical Core sets standards for knowledge and skills in each of the 16 Career Clusters and their associated career pathways that students in all courses of study should have. (For definitions of career pathways, career-ready practices, and the Common Career Technical Core, see the glossary.) The Common Career Technical Core revises the Knowledge and Skills Statements, last updated in 2008, which previously served as standards for the CTE Career Clusters (NASDCTEc, 2008).

Putting It All Together: Aligned Human Capital Management Policies

Ensuring that individual policies work to support CTE teachers is important but insufficient. A piecemeal approach to meeting these needs is unlikely to produce the coherent, sustained level of support that educators need, and that are required to fully realize CTE teachers' potential for affecting students' college and career readiness.

Recent federal, state, and local policy reforms aimed at transforming how all teachers are evaluated and supported offer a pivotal opportunity to take a different approach. A human capital management systems approach helps SEAs and policymakers consider multiple policy areas in relation to one another and to identify connections and interdependencies across policies. Using a systems lens helps improve policy alignment and coherence. To provide sustained supports to CTE teachers, SEAs and policymakers should begin by considering the relationships in three policy areas: certification, evaluation, and professional learning.

> CTE TEACHERS TYPICALLY must work to establish collaborative partnerships with core academic teachers on their own. Although some promising models for collaboration exist, CTE teachers need targeted, intentional support in establishing meaningful partnerships with other teachers and effectively integrating academic and CTE content.

As states and districts implement new evaluation systems, policymakers need to develop professional learning opportunities and processes that will help CTE teachers connect instructional feedback and instructional change to student learning and student outcomes. To do so, evaluation systems must be part of an aligned human capital management system in which evaluation is one component of an integrated system that includes professional learning, preparation, recruitment, and retention policies. In an aligned system of this type, all policies are coherent in how they use data and how they affect educators. For example, an aligned human capital management system might use data on teacher practice generated through evaluations to inform certification requirements, the content of induction and mentoring programs, the professional development offerings to all teachers, and leadership opportunities and employment consequences for teachers.

EVALUATION SYSTEMS
must be part of an aligned human capital management system in which evaluation is one component of an integrated system that includes professional learning, preparation, recruitment, and retention policies.

To ensure that CTE teachers are effective in improving student learning and outcomes, policymakers must take into account the role of CTE teachers. Likewise, states and districts can ensure that CTE teachers can meet the demands of current and future reforms by implementing state and local policies that develop and promote a high-quality CTE teaching workforce. States can ensure that districts are able to craft and implement high-quality local policies by sharing guidance, recommendations, and resources.

In the sections that follow, we provide a starting point for SEAs and CTE stakeholders to explore each policy area in turn. Each section includes an overview of current policy, key issues, and a discussion of potential guiding questions and considerations for SEAs.

Balancing Certification Requirements to Improve Recruitment and Retention

Building a stable, effective CTE teacher workforce requires purposeful policy development that balances competing concerns. Certification policies shape who decides to enter the CTE field, who remains in the profession, and how well prepared teachers are to teach in their subject area. Most CTE teachers enter the profession with little or no training in instruction, and nearly twice as many CTE teachers go through alternative certification processes as teachers overall do (Bazile & Walter, 2009; Bottoms & McNally, 2005; Feistritzer, 2011; NRCCTE, 2011). Rigorous certification requirements play an important role in ensuring knowledge and skill gaps are addressed.

On the other hand, currently, half the states across the country have major shortages of CTE teachers, with more shortages expected to result from retirement in the near future. These shortages are also due in part to the reduction of CTE teacher preparation programs and problems with CTE teacher retention (Asunda, 2011; Bruening et al., 2001; NASDCTEc, 2012). Certification policies for CTE teachers can exacerbate the shortage in two ways. Overly restrictive certification policies can create barriers to recruitment by setting requirements that are unnecessarily burdensome for CTE educators entering the field from certain industries. Conversely, inadequate certification requirements create problems for retention because struggling teachers are more likely to leave the profession (NRCCTE, 2011; Ruhland & Bremer, 2004). Policymakers need to consider the best ways to balance appropriate rigor with ensuring an adequate number of CTE teachers. Part of finding this balance will require policymakers to consider how certification policies function as part of a larger human capital management system. By creating cohesive induction, mentoring, evaluation, and professional learning, states may find additional ways to support rigorous practice and avoid creating unnecessary barriers to teaching in CTE fields.

> **STATES THAT REQUIRE** CTE teachers to have a bachelor's degree may create major barriers to recruitment because many CTE fields do not require a bachelor's degree. For example, many careers in cosmetology, construction, auto mechanics, and technology require training and certification but do not require a bachelor's degree (Cohen & Besharov, 2002; Rothwell, 2013).

Current Certification Policies for CTE Teachers

Certification policies have a significant impact on the recruitment and retention of CTE teachers. States that require CTE teachers to have a bachelor's degree may create major barriers to recruitment because many CTE fields do not require a bachelor's degree. For example, many careers in cosmetology, construction, auto mechanics, and technology require training and certification but do not require a bachelor's degree (Cohen & Besharov, 2002; Rothwell, 2013). Even states that require some teacher preparation coursework may create barriers to recruitment or

retention from the monetary and time investment CTE teacher candidates must make in taking university classes. Policymakers can ensure that CTE teacher candidates are well equipped for success in the classroom by providing alternative certification routes that balance education with other requirements, such as work experience and participation in induction programs.

To better understand the status of state certification policies for CTE teachers, in 2012, the GTL Center and the Midwest Comprehensive Center conducted a policy scan of publicly available information for state-level certification policies and programs for CTE teachers (Bonsu, Bowman, Francis, Larsen, & Polar, 2013). The policy scan included both traditional and alternative certification routes. The information they found had not changed significantly since 2007, when NRCCTE conducted a similar scan.

For more detailed information on state-level certification policies, contact the GTL Center at gtlcenter@air.org or 877-322-8700.

The policy scan showed that certification policies vary significantly between states and between CTE content areas. Despite the variety, state certification policies do have common requirements, such as minimum hours of coursework, related work experience, and examination results.
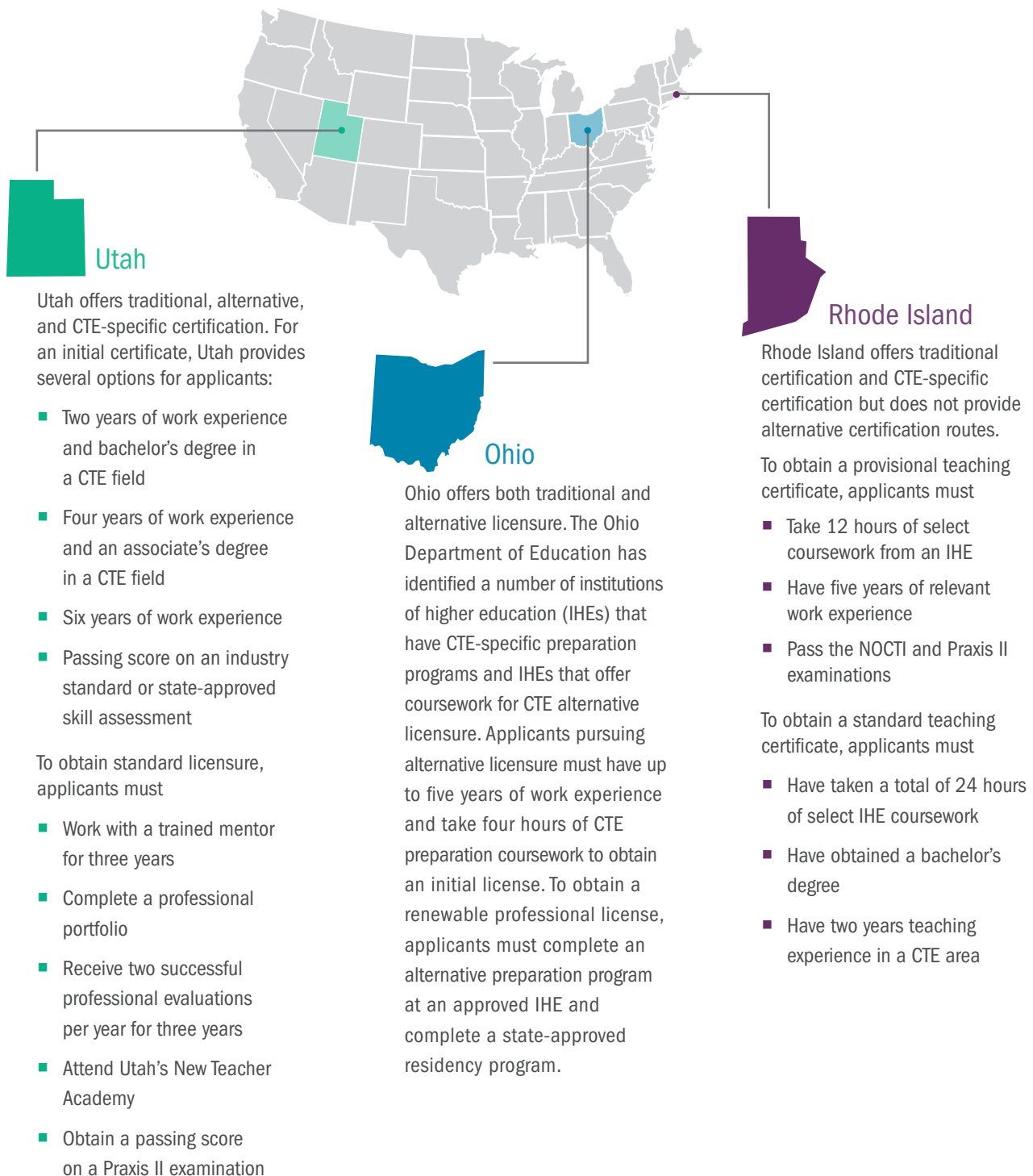
Common Requirements

Many states have a large variety of specialized teaching certificates for CTE content areas and require a certain amount of work experience in that field prior to teaching as part of alternative certification. Some states require CTE teachers to take certification courses to earn a teaching certificate prior to earning tenure, whereas other states require only that CTE teachers pass a basic skills examination. Despite the decline in CTE preparation programs at institutions of higher education, some states also have specialized teacher preparation programs that include endorsements for CTE areas (NASDCTEc, 2012).

All states have traditional certification requirements for CTE teacher candidates who have gone through a teacher preparation program or who have a bachelor's degree in combination with work experience or content knowledge. Many states require that content knowledge be demonstrated through a degree concentration or examination results. Most states also have alternative certification routes, some eventually requiring a bachelor's degree for a renewable teaching license.

Many states have alternative certification routes that do not require a bachelor's degree, although these requirements vary widely between states. Teachers who are certified without a bachelor's degree, however, are not able to achieve highly qualified teacher status, which may mean that they must team-teach in order for students to earn academic credits. Figure 1 provides examples of types of certification requirements for three states.

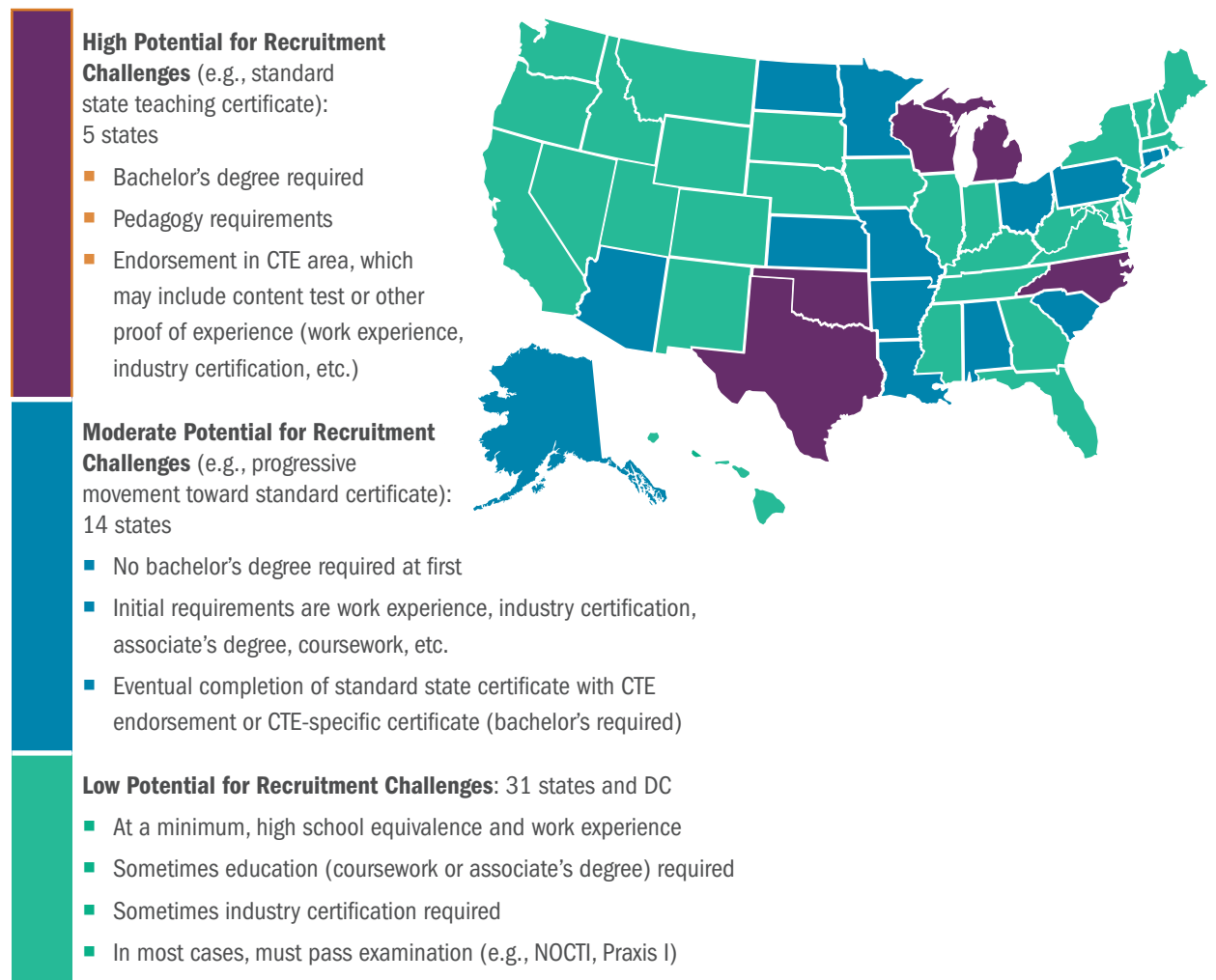**Figure 1. Examples of State Certification Requirements for CTE Teachers**

Utah

Utah offers traditional, alternative, and CTE-specific certification. For an initial certificate, Utah provides several options for applicants:

- Two years of work experience and bachelor's degree in a CTE field
- Four years of work experience and an associate's degree in a CTE field
- Six years of work experience
- Passing score on an industry standard or state-approved skill assessment

To obtain standard licensure, applicants must

- Work with a trained mentor for three years
- Complete a professional portfolio
- Receive two successful professional evaluations per year for three years
- Attend Utah's New Teacher Academy
- Obtain a passing score on a Praxis II examination

Ohio

Ohio offers both traditional and alternative licensure. The Ohio Department of Education has identified a number of institutions of higher education (IHEs) that have CTE-specific preparation programs and IHEs that offer coursework for CTE alternative licensure. Applicants pursuing alternative licensure must have up to five years of work experience and take four hours of CTE preparation coursework to obtain an initial license. To obtain a renewable professional license, applicants must complete an alternative preparation program at an approved IHE and complete a state-approved residency program.

Rhode Island

Rhode Island offers traditional certification and CTE-specific certification but does not provide alternative certification routes.

To obtain a provisional teaching certificate, applicants must

- Take 12 hours of select coursework from an IHE
- Have five years of relevant work experience
- Pass the NOCTI and Praxis II examinations

To obtain a standard teaching certificate, applicants must

- Have taken a total of 24 hours of select IHE coursework
- Have obtained a bachelor's degree
- Have two years teaching experience in a CTE area

Source: Bonsu, Bowman, Francis, Larsen, & Polar, 2013

A Continuum of Certification Requirements

To help SEAs and CTE stakeholders initiate a discussion on the potential impacts of certification policies on CTE teacher recruitment, retention, and effectiveness, the results of a policy scan (Bonsu et al., 2013) were organized according to each state's potential for creating recruitment challenges. Each state's requirements for certification are placed into one of three ranks from low to high according to their potential to offer recruitment challenges. Because of variation across state policy, the categories are continuous rather than discrete (no state fits perfectly in any single category and may shade toward one end of the category or the other). Because higher education coursework requirements can create challenges in recruiting CTE teachers, the categories are anchored in whether the state requires a bachelor's degree for initial or renewable certification.

Figure 2. State Certification Requirements

High Potential for Recruitment Challenges (e.g., standard state teaching certificate): 5 states

- Bachelor's degree required
- Pedagogy requirements
- Endorsement in CTE area, which may include content test or other proof of experience (work experience, industry certification, etc.)

Moderate Potential for Recruitment Challenges (e.g., progressive movement toward standard certificate): 14 states

- No bachelor's degree required at first
- Initial requirements are work experience, industry certification, associate's degree, coursework, etc.
- Eventual completion of standard state certificate with CTE endorsement or CTE-specific certificate (bachelor's required)

Low Potential for Recruitment Challenges: 31 states and DC

- At a minimum, high school equivalence and work experience
- Sometimes education (coursework or associate's degree) required
- Sometimes industry certification required
- In most cases, must pass examination (e.g., NOCTI, Praxis I)

Source: Bonsu et al., 2013

State policymakers and CTE stakeholders may use these categories as guideposts to consider potential strengths and challenges of current certification policies:

- If your state falls into the "High Potential for Recruitment Challenges" category, you should determine whether there are shortages of CTE teachers or CTE teacher applicants statewide. Examine other data statewide, such as retention and effectiveness trends for CTE teachers, to determine whether more stringent certification policies also may have a positive impact on CTE teacher retention and effectiveness.

- If your state falls into the "Moderate Potential for Recruitment Challenges" category, you should determine whether there are high turnover rates for CTE teachers with provisional licenses, shortages of CTE teachers, or shortages of CTE teacher applicants, especially in certain fields. Examine the trends in the qualifications of initial CTE teacher applicants and their subsequent success in the classroom.

- If your state falls into the "Low Potential for Recruitment Challenges" category, you should determine whether there are high attrition rates for CTE teachers with provisional licenses or other retention problems. Examine teacher effectiveness and student outcome data to determine the potential impact of certification policies on overall teacher quality.

Strategies to Balance Rigor, Recruitment, and Retention

The structure of CTE teacher certification requirements may have a major impact on the ability of states and districts to recruit and retain CTE teachers. For CTE teachers, meaningful work experience in a specific technical area and pedagogical skills are equally important for future success in the classroom. The real-world experience that CTE teachers bring to the classroom and the perspectives they can share can make learning more meaningful and beneficial to students. At the same time, it is critical that CTE teachers have the pedagogical skills to translate their knowledge into effective, differentiated instruction for a diverse student population. Balancing the requirements for career knowledge and pedagogical skills can pose a challenge for policymakers. The following strategies are provided as suggested first steps for SEAs and CTE stakeholders to consider in determining certification requirements.

STRATEGY 1. Assess whether coursework requirements are in fact a barrier to recruitment, particularly in hard-to-staff CTE subject areas.

CTE teacher candidates who are required to complete several college courses in pedagogy prior to earning a provisional certification may be unwilling or unable to invest the money and time needed prior to ever setting foot in a classroom. Completing coursework prior to teaching may also be a barrier for candidates who are several years removed from any postsecondary experience as a result of their workforce experience. States

that require a bachelor's degree for initial certification may encounter challenges in recruiting CTE teachers for the many technical areas that do not require a bachelor's degree to work in the field (Bazile & Walter, 2009). CTE stakeholders can help inform states and policymakers about the common education requirements for CTE careers and fields for which there may be teacher shortages.

STRATEGY 2. Create paths to renewable certification for CTE teachers in fields that do not require a bachelor's degree and establish strong connections to ongoing professional learning opportunities.

Diverse certification paths help to address recruitment challenges and reduce barriers to entry for badly needed CTE instructors. CTE teachers without a bachelor's degree can still be effective in the classroom; CTE teachers who have work experience but no bachelor's degree positively affect student achievement and meaningfully connect with students about career paths, provided that they have access to high-quality professional learning opportunities (Constantine et al., 2009; Gaunt & Palmer, 2005; Hammond et al., 2013). In states that allow CTE teachers to obtain a provisional certificate without a bachelor's degree, many CTE teachers work toward their degree while pursuing a renewable teaching certificate. For example, most CTE teachers in Alabama work toward earning their degree as they move from an initial certification, to a provisional certification requiring 45 hours of coursework, to a renewable license (Conneely & Uy, 2010).

STRATEGY 3. Assess whether existing certification requirements ensure that CTE teachers enter the classroom with the skills they will need to be effective.

Although requiring fewer courses in pedagogy for certification may help to increase the recruitment of CTE teachers, it may exacerbate the challenges many CTE teachers face in being prepared for classroom instruction and ultimately increase CTE teacher turnover. For example, 75 percent of incoming CTE teachers have little or no training in instruction or the use of assessments (Headrick & Bottoms, 2012). CTE teachers, like many novice teachers, often face challenges with skills such as differentiated instruction and classroom management (Cannon, Kitchel, Duncan, & Arnett, 2011; Drage, 2010; Garet, Porter, Desimone, Birman, & Yoon, 2001; Kerna, 2012; Sturko & Gregson, 2009). Likewise, teachers of some CTE content areas may be less academically prepared or skilled than core academic content teachers in both reading and mathematical skills (Cramer, 2004). CTE teachers who are underprepared to meet instructional challenges will struggle to improve student outcomes and may contribute to CTE teacher shortages by leaving the profession early (NRCCTE, 2011; Ruhland & Bremer, 2004).

A Systems Approach: Connecting Certification With Induction, Mentoring, and Ongoing Professional Learning

To help balance the need for rigor while improving recruitment and retention, consider how other human capital management policies related to certification may reinforce rigor, address policy gaps, and increase access to ongoing learning supports for CTE teachers. It is important that CTE teacher candidates have training and support in instructional practices, classroom management, use of data and assessments, and other topics to ensure that they can be effective in the classroom. This knowledge and these skills may be introduced in college coursework, but they also can be introduced and mastered through professional learning supports such as induction and mentoring programs. All CTE teachers should enter the classroom with some instructional knowledge, but CTE teachers also can develop and grow their skills as professional educators while teaching.

Induction Support for CTE Teachers

To address the challenges that many teachers face in their first years of teaching, some states and districts have established induction, mentoring, or peer assistance and review programs to assist novice teachers in developing the skills they need to be effective. These programs can especially help novice CTE teachers who have not gone through traditional preparation programs to address their most pressing needs. Support from experienced educators and guidance in curriculum, planning, and use of assessments can make a dramatic difference in CTE teacher success (Adams, 2010; Headrick & Bottoms, 2012). There is a substantial body of work on induction, mentoring, and peer assistance and review programs that states and districts may utilize in designing a comprehensive support system for incoming CTE teachers (Harvard Graduate School of Education, 2012; Johnson et al., 2009; Papay & Johnson, 2012). Although these programs vary significantly in scope, it is important for any comprehensive support system used for CTE teachers to include

- Substantial, ongoing support through multiple resources

- Introductory professional development about state and district policies

- Mentor or leadership support in establishing routines such as classroom management and lesson planning

- Regular mentoring or coaching support in providing high-quality instruction for a diverse set of learners

Built around these principles, the Southern Regional Education Board (SREB), in partnership with NRCCTE, has developed a fast-track CTE educator preparation and induction model for teachers who have gone through an alternative certification process.

SREB CTE Alternative Certification Teacher Induction Model

SREB partnered with the National Research Center for Career and Technical Education to create "an induction model for new CTE teachers pursuing an alternative route to certification that increases their career commitment, competency and self-efficacy" (Bottoms, Egelson, Sass, & Uhn, 2013, p. 1) and improves CTE teacher instructional practice. The model includes

- Summer orientation
- Multiday professional development workshops
- Continuous support from a professional development coach, mentor, or administrator
- Online community of practice

The model focuses specifically on instructional planning and strategies, use of assessment, and classroom management. This combination of individual teacher support and a culture of support in the school setting can help novice CTE teachers hone their teaching skills and provide a setting in which they feel comfortable reaching out to colleagues and supervisors for assistance. Although this model requires a significant time investment from teachers, participants have reported that the program, especially the on-site support, has had a positive impact on their practice in key instructional skills. The model was field-tested, piloted, and refined over five years and is now being implemented in several Oklahoma districts. To date, SREB has reported some promising outcomes, including improvement in commitment to the teaching profession (80 percent) and improvement in retention rates (70–89 percent; Bottoms et al., 2013).

RESOURCES:

Overview
http://www.nrccte.org/resources/studies/alternative-licensure-cte-teacher-induction-model

Final pilot report
http://www.nrccte.org/sites/default/files/publication-files/nrccte_sreb_alternative_certification.pdf and http://publications.sreb.org/2012/CTE_Profile%20_Year4_5_Final.pdf

Presentation
http://www.careertech.org/file_download/f9add8af-82a1-49f6-83e1-9d223a81577c.pdf

Externships: Improving Recruitment and Increasing Collaboration

Externships can help districts recruit new CTE teachers from an existing pool of teachers. Certified teachers of non-CTE subjects who lack industry experience can engage in an externship opportunity to learn about a CTE field and attain a CTE endorsement as part of their existing certification. Teachers spend time in the summer or take a leave of absence from the classroom to work in an industry, gaining

skills and knowledge from the workforce. Externships also can help local industry by ensuring that CTE teachers of relevant subjects have the most up-to-date information from the field and are well positioned to prepare students for local employment.

Externships also can help improve teacher effectiveness in both CTE and non-CTE subjects. Current CTE teachers can stay up to date on industry trends, especially in rapidly changing fields like technology. Likewise, externships can provide opportunities akin to those typically provided by industry advisory committees to CTE programs. Externships can help all teachers, not just those in CTE courses, identify real-world applications for course content and inspire students.

Summary and Guiding Questions

CTE teacher shortages are a major issue for many states and districts. Policymakers can work to balance rigorous certification requirements with the need for industry knowledge. Any requirements for permanent or renewable certification should include some pedagogical training and knowledge building but also avoid creating major barriers to CTE teacher certification. Policymakers can help achieve balanced certification requirements by taking a systems approach and by establishing policy alignments with induction, mentoring, and peer assistance and review programs to support novice CTE teachers. In addition, states and districts may be able to promote CTE teaching positions for teachers with existing licenses through externships and other sponsored opportunities to gain industry experience.

The following questions are designed to help guide state-level policymakers and CTE practitioners in ensuring that the certification policies in place are aligned to the needs of CTE teachers.

- What opportunities for entry to the profession does your state or district provide to CTE teachers?

- What are the possible barriers to entry? Are these barriers appropriate? How can barriers be addressed?

- To what extent does your state's career path for CTE teachers include courses in pedagogy, postsecondary degree requirements, or industry certification requirements?

- Does your school or district provide induction programs specifically tailored to alternatively certified CTE teachers?

- Does your state or district provide opportunities for CTE teachers to share feedback about their beginning teaching experiences and needs?

- Does your state have barriers to postsecondary faculty teaching CTE courses at the secondary level?

Performance Evaluation and Professional Feedback: Adjusting Policies for CTE Teachers

Beyond certification requirements, policymakers can ensure that CTE teachers are successful and supported by aligning evaluation systems with induction, mentoring, and professional learning. Aligned evaluation systems can provide states and policymakers with important data to inform recruitment, mentoring, and professional learning. Because evaluation systems can provide teachers with important feedback to improve teaching and learning, it is important for evaluation policies to be thoughtfully designed with regard to CTE teachers' roles and teaching assignments.

Evaluation policies typically cover all instructional personnel and classroom teachers. Specific evaluation requirements or measures, however, may be different for different types of teachers (Goe & Holdheide, 2011; Marion & Buckley, 2011). Common evaluation measures are

- Practice measures (primarily classroom observations)

- Evidence of student growth or achievement

- Surveys of students, parents, or other staff

Some states and districts include other components, such as leadership activities, teacher or student attendance, and lesson planning. These measures may be used to gather evidence for a practice component in a rubric or as separate evaluation component (Center on Great Teachers and Leaders, 2013; MET Project, 2013).

Evaluation Policies for CTE Teachers

The GTL Center conducted a scan for themes in state-level evaluation policies for CTE teachers in the Online Database of State Principal and Teacher Evaluation Systems and in other publicly available documents. Most states had not specifically addressed CTE teachers within their teacher evaluation regulations and policies. In fact, most states provide a blanket rule in their official state regulation that their evaluation system includes all certified teachers. Therefore, as long as CTE teachers hold a state teaching certificate and fit the definition of "teacher" as defined by state regulation, they are included in the evaluation system.

Many states allow degrees of local flexibility so that districts may approach educator evaluation in different ways for different types of teachers; no states, however, offer guidance or recommendations on differentiating evaluation processes or tools for CTE teachers. For evaluations, CTE teachers are usually categorized as teachers of nontested subjects and grades (e.g., teachers for whom individual value-added

or student growth percentile scores are not available—see glossary for more information). Most CTE teachers are evaluated in the same way as the majority of secondary teachers. States should thoughtfully consider the role of CTE teachers, for the evaluation systems used for all secondary teachers may not capture CTE teachers' actual unique contribution to student outcomes or may fail to provide the type of feedback and support CTE teachers need in order to improve.

When designing evaluation systems, the state typically determines the types of decisions districts are responsible for making, sets minimum requirements, and—most important—provides guidance to districts on how to design and implement evaluation systems appropriate to local contexts. Forty-two states require that districts make many, if not most, key decisions about the design of the evaluation system (Center on Great Teachers and Leaders, 2013). Likewise, districts are ultimately responsible for implementing the evaluation system with fidelity and ensuring that it promotes better teaching and learning. It is important that state education agencies provide guidance to districts on how best to adapt evaluation systems for CTE teachers because of districts' role in evaluations.

Guidance on evaluations for CTE teachers may be comprehensive or focus on specific district questions. Choosing appropriate measures of student growth for CTE teachers has been a major focus recently because measuring student growth is highly dependent on what assessments are available and appropriate. Beyond student growth, it is important for states and districts to consider how all evaluation measures, including practice measures, capture CTE teacher performance.

Practice Measures

Practice measures in teacher evaluation systems often consist primarily of classroom observations, which may

- Vary in number from few to many (e.g., 2 to 10 observations per year)

- Be required at different intervals or in different time frames during the year

- Be announced (scheduled in advance) or unannounced (in which the teacher does not know the observation will occur until the observer arrives)

- Be formal (often of a certain length of time or including certain lesson elements and announced) or informal (often considered a "drop-in" for a short time and unannounced, which might or might not be included in the summative evaluation)

- Vary in number or type for novice or untenured versus tenured or veteran teachers

Rubrics used for practice measures are typically common across groups of teachers or are differentiated only for specialists such as librarians or support staff. For example, Massachusetts provides different practice rubrics for classroom teachers and school instructional support specialists. Evaluators can still differentiate between types of classroom teachers, however, using the same rubric through their use of evidence of practice and artifact review. States and districts help ensure that evaluators use the appropriate evidence of practice and artifacts for different types of teachers by providing guidance with specific examples. Several states already provide this kind of guidance for observing special education teachers (Holdheide, 2013). The same guidance approach can be used to ensure that evaluators use observation and practice rubrics appropriately for CTE teachers. States should work to include CTE teachers and administrators in creating this guidance to ensure that it is accurate, appropriate, and usable in various settings.
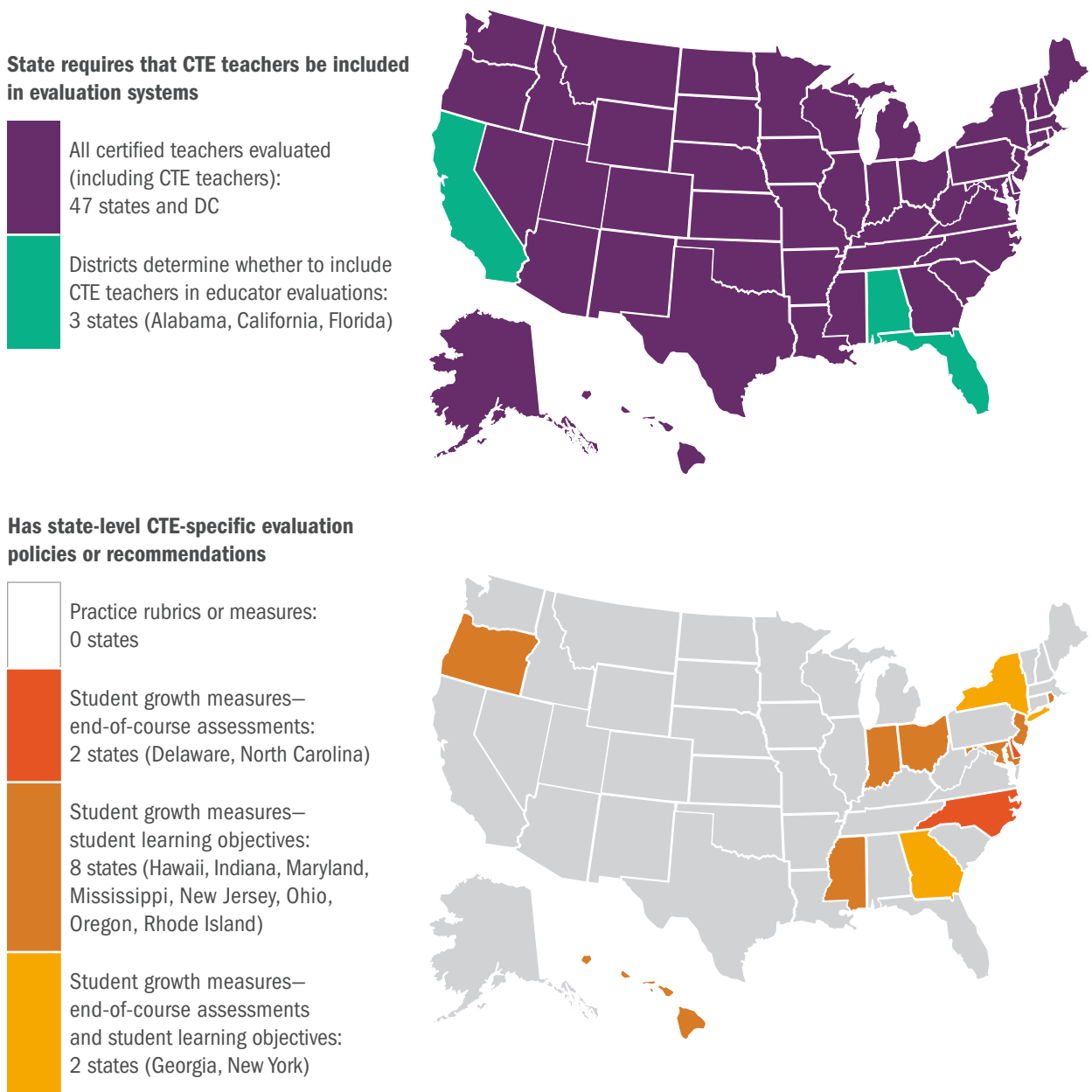
It is critical for evaluators to know what evidence to collect and how best to collect it for the teacher they are observing or evaluating. Evaluators in districts that do not have administrative CTE staff may not fully understand the CTE subject area or its objectives. For example, an assistant principal or the principal in a high school may serve as an evaluator for a CTE teacher of health sciences. Regardless of the evaluator's subject-matter knowledge, he or she may have no difficulty determining whether the health science CTE teacher establishes universally beneficial practices, such as creating positive relationships with students. If the evaluator does not have in-depth knowledge of the health sciences content and industry, accurately assessing whether the teacher uses appropriate instructional resources for health science, however, would pose a challenge. States, districts, and CTE organizations should collaborate to prevent problems (e.g., interrater reliability or validity) associated with observation or other practice measures by creating clear guidance on what types of evidence may be appropriate for specific indicators in commonly used rubrics when evaluating CTE teachers. Evaluation systems can produce better, more specific feedback to inform a teacher's ongoing professional learning and improve practice when evaluators have guidance in how to best use practice measures.

Student Growth Measures

The 12 states (see Figure 3) that have provided guidance or recommendations for how to include CTE teachers in evaluations have focused on how to measure student growth. Measuring student growth for all teachers of nontested grades and subjects is a challenge for many states and districts, but it may be especially challenging for CTE teachers. First, most CTE programs use industry certifications as their assessment measures and only a few states use technical skill assessments. One of the students' goals is often to attain meaningful industry certifications and, where applicable, matriculate to postsecondary institutions to continue their program of study (Duncan, 2011). For teachers, however, these outcomes cannot be used to demonstrate

student growth for evaluation purposes. Assessments used to measure student growth may be state-, district-, or teacher-created but must have a pretest and a posttest to assess student's knowledge and skills at two points in time. Industry certifications have no pretest. Furthermore, test results from industry certifications typically belong to students and the testing agency and are not routinely shared with the state or district. Although industry certifications and matriculation rates are meaningful student outcomes that may be used to measure the success of CTE programs, they cannot be used on their own to measure student growth.

Figure 3. State-Level Evaluation Policies for CTE Teachers

State requires that CTE teachers be included in evaluation systems

All certified teachers evaluated (including CTE teachers):
47 states and DC

Districts determine whether to include CTE teachers in educator evaluations:
3 states (Alabama, California, Florida)

Has state-level CTE-specific evaluation policies or recommendations

Practice rubrics or measures:
0 states

Student growth measures—
end-of-course assessments:
2 states (Delaware, North Carolina)

Student growth measures—
student learning objectives:
8 states (Hawaii, Indiana, Maryland, Mississippi, New Jersey, Ohio, Oregon, Rhode Island)

Student growth measures—
end-of-course assessments
and student learning objectives:
2 states (Georgia, New York)

Source: State Teacher and Principal Evaluation Databases, Center on Great Teachers and Leaders

Second, the assessments that are the most relevant to student learning can be difficult to use for evaluation purposes. In many CTE subject areas, the objectives for CTE students are a combination of both knowledge and practical skills. Students' mastery of these important practical skills are typically not well suited to independently administered pencil-and-paper or computer-based assessments, but rather teacher-administered assessments, such as rubrics or checklists. For instance, the Common Career Technical Core includes skills such as being able to operate and maintain mechanical systems, demonstrating safe and effective handling of materials and tools, and developing products, which can be difficult to assess through traditional knowledge-based written assessments. In addition, the Career Readiness Partner Council has defined career readiness as encompassing a variety of skills and dispositions that go beyond typical growth assessments (Career Readiness Partner Council, 2013). Measuring student growth for these skills is more complex for states and districts than measuring student growth through a single yearly state examination.

States and districts should strive to use multiple measures of student growth and achievement to ensure that CTE teachers are appropriately evaluated for their impact on student outcomes and learning. States and districts can benefit from incorporating CTE teacher voice and feedback in the design or redesign of the evaluation system to improve stakeholder buy-in and ensure that the system appropriately captures teacher effectiveness.

Student Growth Percentiles and Value-Added Measures

Some standardized student growth measures, such as student growth percentiles and value-added measures, are appropriate for CTE teachers in some roles if appropriate data are available. If literacy and mathematics skills are integrated into CTE instruction to a significant extent and the CTE students also are taking courses in subjects assessed through state standardized tests, student outcomes on state assessments or other academic measures may be used as one measure of student growth for those CTE teachers. States and districts can review guidance on scores in coteaching settings to ensure that student growth is properly attributed for CTE teachers (Bel Hadj Amor, Tucker, & Ozek, 2013). It is important that standardized student growth measures not be used as the sole measure of growth for CTE teachers, but one of several measures that also capture learning of CTE-specific content.

End-of-Course Assessments

End-of-course assessments for CTE courses may be appropriate as one measure of student growth and learning, but few states offer or require such assessments.

States that do require end-of-course assessments must develop pretests in order for end-of-course assessments to measure growth. The National Occupational Competency Testing Institute (NOCTI), a commercial assessment vendor, has developed this type of pre- and postassessment for all career pathways. End-of-course assessments, however, present several challenges. One challenge associated with end-of-course assessments to consider is student motivation: Students may skip testing days or neglect to perform to the best of their abilities if the assessments are not linked to students' grades, graduation requirements, or career opportunities. Another challenge is the assessment of practical skill development and attainment, which are common to many CTE subjects and cannot be adequately measured through written assessments. As with standardized assessments, it is important that end-of-course assessments not be used as the sole measure of student growth for CTE teachers.

Student Learning Objectives (SLOs)

To address these challenges, states and districts may use a number of alternative assessments in combination with standardized or end-of-course assessments as part of a student learning objective process. These alternative measures may include any combination of the following:

- Industry certification attainment

- Running records of skill attainment and student performance

- Likert scale ratings of performance

- Rubrics, including self-evaluation, peer evaluation, or teacher ratings

- Portfolios

- Career and Technical Student Organization competition results

These alternative measures may not be appropriate as a single measure of growth or achievement, but when used in addition to standardized or end-of-course assessments, they may help reflect the impact of CTE teachers on student learning. In addition, these types of alternative assessments may be more appropriate for the project-based learning typical of CTE courses.

One strategy for incorporating multiple types of student learning measures in CTE teacher evaluations may be to use student learning objectives (SLOs). For CTE teachers, SLOs can include academic growth measures, achievement on knowledge-based assessments, attainment of industry certifications, matriculation, and other CTE-specific measures. One major benefit of SLOs is that they are typically written or adapted by teachers and school-level administrators, which means that SLOs can

accurately reflect the growth goals of groups of students and capture unique classroom circumstances. Using additional formative assessments in CTE courses can help to better track student outcomes as well as provide additional data for SLOs. SLOs also can include matriculation rates for students, although it may be more challenging to gather such data or similar data on postsecondary success.

Some states and districts have already adopted SLOs: Hawaii, Indiana, Maryland, Mississippi, New Jersey, New York, Ohio, Oregon, and Rhode Island have provided information on or examples of SLOs for specific kinds of CTE teachers. CTE teachers and administrators, however, need to have access to information on appropriate benchmarks in order to set appropriate growth targets for students. Likewise, evaluation systems that use these alternative assessments require more training and administrative oversight than traditional written assessments. To ensure that SLOs produce reliable and consistent student growth scores, teachers must receive professional development on how to effectively write SLOs and administrators must receive professional development on how to assess SLOs for rigor and fairness. Administrators also must have clear processes in place for reviewing and vetting SLOs in a timely manner.

NOCTI Assessments

The National Occupational Competency Testing Institute (NOCTI) is a not-for-profit consortium of the 50 states and the U.S. territories that works to provide assessments in career and technical education. In response to the need for high-quality assessments that could be incorporated into teacher evaluation systems, NOCTI has developed commercial pre- and postassessments for all career pathways. In New York State, these assessments have been included on the state-approved vendor list for teacher and principal evaluations. This extensive list of more than 100 assessments covers a variety of subjects, ranging from accounting to carpentry to television production. The assessments include multiple-choice pretests, multiple-choice posttests, and performance posttests, which enable teachers to measure student growth in career and technical education subjects. Assessment blueprints that provide an overview of assessments are available on the NOCTI website.

RESOURCES:

NOCTI assessment blueprints
http://www.nocti.org/Blueprint.cfm

North Carolina Growth Guidance for CTE Teachers

North Carolina has a state-level evaluation system and requires all districts to use the state evaluation system. The North Carolina Department of Public Instruction has issued guidance on which student growth measures should be used for teachers of nontested subjects and grades. This guidance includes a section on CTE teachers, which lists all CTE courses in the state and specifies which evaluation measures should be used to calculate student growth for teachers of these courses. North Carolina uses two approaches to measuring student growth for CTE teachers:

- EVASS Growth Model: a value-added growth model based on career and technical education postassessments (end-of-course examinations) or LEA-administered assessments given as part of Elements (a CTE assessment and student data platform used across North Carolina).

- Pre- and Post-Test Model: a simple growth model based on state-administered Elements assessments at the high school level and LEA-administered Elements at the middle school level.

Which courses CTE teachers teach determines which of these two ways they have their growth calculated. The North Carolina Department of Public Instruction plans to issue further guidance on how to calculate growth for CTE teachers who are instructors in courses using different growth models in the future.

RESOURCES:

Measuring Growth for Educator Effectiveness
http://www.ncpublicschools.org/docs/effectiveness-model/ncees/measure-growth-guide.pdf

Elements Case Studies
http://thinkgate.net/department-of-public-instruction-career-technical-education-nc/

Other Evaluation Measures

Other evaluation measures tend to focus on teacher practice beyond classroom instruction (such as planning or professional responsibilities) and, in some cases, include feedback from students, parents, or fellow staff members. Like observation and practice rubrics, states and districts that include feedback from students, parents, or fellow staff members in evaluations typically do not use different types of surveys for different types of teachers. Feedback measures such as surveys can capture evidence of one of the greatest and most beneficial supports that CTE teachers tend to provide to their students: motivation, support, and encouragement (Gentry, Peters, & Mann, 2007; Gentry, Rizza, Peters, & Hu, 2005).

Research has shown that students in CTE courses value

- Having an instructor with practical knowledge of the workforce

- The personal relationships they are able to foster with their instructors that result from similar interests

- The "hands-on" instructional style of many CTE teachers

Because many students self-select to pursue a CTE career pathway or program of study, the teacher–student relationship and interactions may be more meaningful to students enrolled in CTE programs and have a significant impact on student learning (Gaunt & Palmer, 2005; Gentry et al., 2007; Gentry et al., 2005; Hammond et al., 2013). Student motivation and teacher–student relationships may have a direct impact on student success; therefore, using student surveys, such as Tripod surveys, or other feedback measures may be a good indicator of a teacher's impact. In addition, the Measures of Effective Teaching (MET) project has found that student surveys, when paired with observation and student growth measures, can provide more valid and meaningful evaluation results (MET Project, 2013).

Summary and Guiding Questions

District and school leaders should consider the role, assignment, and school context of CTE teachers in designing and implementing evaluation systems. Districts may need to find innovative ways to generate comparable student growth data, such as using data regionwide instead of districtwide, to ensure that results are reliable. State and district leaders also should consider how these policies may differently affect different groups of teachers. CTE teachers who have few fellow secondary CTE teachers or are the sole secondary CTE teacher at their school may feel that their evaluations—and the consequences—are unfairly different from those for their colleagues. It is important that secondary CTE teachers feel that their evaluations are unique to their context but also fair in comparison to policies affecting the other teachers in their building. One way to do this and garner support for evaluation systems among staff is to give CTE teachers multiple opportunities and venues to provide feedback during the evaluation design and implementation process, allowing them to help create a system that is meaningful to them while providing valuable assistance to state and district leaders.

Evaluation systems provide LEAs and SEAs with valuable data on teacher performance but should be primarily focused on providing teachers of all grades and subjects with valuable feedback on their practice. Without accurate and timely feedback, CTE teachers may miss opportunities for continuous improvement and professional

growth. Although choosing appropriate evaluation measures is a prerequisite for providing meaningful feedback, it also is important to include multiple opportunities for dialogue in the evaluation cycle. Conversations about practice, such as pre- and postobservation conferences or periodic check-in meetings to discuss formative evaluation data, are a critical link between evaluation policies and professional growth.

The following questions are designed to help guide state-level policymakers and CTE practitioners in ensuring that the evaluation policies in place are aligned to the needs of CTE teachers.

- Are there CTE administrators or other evaluators familiar with CTE?

- Are there opportunities for CTE teachers to give feedback on evaluation measures prior to full implementation?

- Does training on the evaluation system for both evaluators and evaluatees include information or calibration on using practice measures for specific types of teachers, including CTE teachers?

- Has your state or district determined what measures and assessments are currently available for use in educator evaluations?

- Has your state or district created guidance on gathering evidence or using assessments for CTE teachers?

- Is CTE part of the state accountability system and is teacher evaluation connected to the relevant reporting requirements?

- Are there opportunities to evaluate CTE teachers and academic teachers in a collaborative environment?

- To what extent do evaluation data (if available) differentiate CTE teachers' performance? Do the data present any problems with interrater reliability or consistency of scores?

The Key Connection: Professional Learning Opportunities for CTE Teachers

CTE teachers need support through high-quality professional learning opportunities in order to have an effective impact on students' college and career readiness. There also is an increase in national focus on support for CTE teachers. One major current federal priority has been to study best practices and new approaches for CTE professional development (National Center for Innovation in Career and Technical Education [NCiCTE], 2013). Because most CTE teachers go through alternative certification processes, CTE teachers often need more support in common areas such as the use of assessments, classroom management, and differentiating instruction. Ongoing professional learning opportunities are the key lever in an aligned human capital management system. These opportunities can ensure that all certified teachers, regardless of their background, stay in the profession, are effective at promoting student learning and outcomes, and continuously improve their practice.

All teachers—including CTE teachers—must regularly take professional development courses to maintain their teaching license. CTE teachers participate in professional development similar to that of most other teachers, including both content-based professional development and professional development on broader topics such as diversity or student engagement. Professional development courses are typically organized through local institutions of higher education or the district and are structured by clock hours or credits. Content-based professional development is especially important for some CTE teachers to ensure that they keep their technical skills and knowledge up to date, especially in rapidly advancing fields and STEM subjects. Professional development, however, must help to improve CTE teachers' overall instruction. The Perkins Act requires districts that do not have satisfactory performance on any given performance measure to use Perkins funds to address that issue, and often these funds are used for professional development.

A Systems Approach: Connecting Certification and Evaluation to Continuous and Ongoing Professional Learning

Currently, some states and districts have been shifting from credit-based professional development to job-embedded professional learning, in which teachers utilize evaluation feedback to continuously improve practice (Coggshall, Rasmussen, Colton, Milton, & Jacques, 2012; Hill, Charalambos, & Kraft, 2007). This type of ongoing, job-embedded professional learning is critically important in ensuring that CTE teachers are able to integrate academic content and meet the expectations of new, more rigorous standards

such as the Common Core and the Common Career Technical Core. Ongoing, job-embedded professional learning provides CTE teachers with opportunities to respond to formative and summative feedback, generated through evaluations, to improve their practice on the basis of their own unique strengths and areas for growth. Although traditional professional development still is important for some topics, it often is disconnected from CTE teachers' individual needs for improving practice.

Despite the promise of a professional learning approach, most states continue to require more traditional professional development credits or clock hours and have not implemented ongoing professional learning approaches tailored to CTE teachers (Center on Great Teachers and Leaders, 2013). Policymakers can address this disconnect by considering a variety of promising approaches to professional learning that can help ensure that all CTE teachers are effective in the classroom.

Ongoing, Job-Embedded Professional Learning

CTE teachers, like all teachers, need ongoing, job-embedded professional learning supports to engage in continuous improvement and refinement of their instructional skills (NRCCTE, 2012; O'Connor, 2012; Ruhland & Bremer, 2002). Novice CTE teachers report that they need support on similar topics, such as student engagement, active learning strategies, and classroom management, as all new teachers do (Cannon, Kitchel, Duncan, & Arnett, 2011; Drage, 2010; Garet, Porter, Desimone, Birman, & Yoon, 2001; Kerna, 2012; Sturko & Gregson, 2009). The SREB Alternative Teacher Preparation Model, which includes multiple ongoing professional learning supports, can help new CTE teachers address specific challenges and grow professionally. In addition, this type of professional learning approach may help improve practice for more experienced CTE teachers. In fact, experienced teachers in districts piloting the SREB Alternative Teacher Preparation Model have reported that they also need the supports the program provides because their professional development experiences had previously not addressed the need for applied, continuous learning (Skidmore & Headrick, 2013). There are many ways in which teachers may engage in ongoing professional learning, such as the portfolio-based professional learning in working toward National Board certification or instructional coaching cycles based on formative evaluation results.

Ongoing professional learning models also can help CTE teachers integrate academic content into their courses. Although integrating academic content has become a more standard practice, it still is a challenge for many CTE teachers because training and coordination at the school level are lacking. NRCCTE[2] responded to this need by developing research-based professional development models (http://www.nrccte.org/professional-development) for CTE teachers. The models help CTE teachers

---

[2] NRCCTE was the predecessor to the National Center for Innovation in Career and Technical Education (NCiCTE) and was funded by OVAE through the Perkins Act.

learn how to incorporate literacy and mathematics content and use data to inform instruction (NRCCTE, 2012). Research by NRCCTE shows that this type of professional development offering has a positive impact on instruction; its research also reports that teachers want more extended professional development opportunities to ensure that they can continue to successfully integrate academic content (NRCCTE, 2012). This type of professional development may be interdisciplinary and provide opportunities for CTE teachers to collaborate with other teachers in their building, including core academic teachers.

Collaborative Teaching and Professional Learning Models

To further address the need for support in integrating academic content in CTE instruction, partnerships between CTE teachers and relevant core academic teachers (i.e., mathematics, science, and literacy) have become more common. There are two main benefits to partnerships between CTE teachers and core academic teachers. First, CTE and core academic teachers can work together in helping students develop academic, technical, and cross-cutting skills such as digital literacy and critical thinking through a combination of academic and CTE content instruction. This collaborative approach also can help core content teachers meet Common Core objectives by connecting academic content to the real-world application in CTE courses.

Second, collaborative partnerships can help to address issues with meeting highly qualified teacher requirements for course credit because most core academic teachers have a bachelor's degree. Although many CTE teachers and core academic teachers have forged partnerships on their own, schools and districts that have encouraged these partnerships have often coordinated professional development on similar topics for CTE and core academic teachers to attend together or recommended that CTE and core academic teachers attend professional development of their own choice together. Similarly, CTE teachers may collaborate through online communities of practice, such as in the SREB Alternative Certification Model. (See the example on page 16, Induction Support for CTE Teachers.)

Combined Professional Development for CTE and Core Academic Teachers

MISSOURI

The Missouri Department of Education has offered professional development that brings CTE teachers and core academic teachers together to engage in project-based learning around the Common Core. In 2010, the Missouri Department of Education partnered with Missouri State University at the MAKE Conference to have CTE teachers and core academic teachers develop instructional resources together and determine how to make them relevant to students. These sessions also included combined professional development on technical writing instruction, digital literacy, and writing as part of project-based learning (Achieve, 2012).

MAKE Conference
http://owp.missouristate.edu/120529.htm

ConnectEd

ConnectEd: The California Center for College and Career has developed the Linked Learning model, which combines core academic instruction and CTE content in a project-based learning environment. In schools using the Linked Learning model, teachers are encouraged and supported in collaborating with each other to integrate instruction. The Linked Learning approach is a type of career academy. (See glossary for more information.)

ConnectEd has developed professional development modules based on this approach for both teachers and administrators. These professional development modules include sessions on incorporating academic content, curriculum development, subject-specific content knowledge, and use of assessment and data. ConnectEd also has professional development courses for CTE leadership. These modules provide much of the support that CTE teachers need, but they follow the "seat-based" professional development model and do not address feedback on a teacher's current practice. It is important that professional development for CTE teachers also include continuous improvement through coaching, mentoring, peer feedback, or other structures to address individual teacher practice and needs.

ConnectEd Professional Development
http://www.connectedcalifornia.org/schools_districts/professional_development

Career Academies

The career academy model, which has been used for more than 30 years in some districts, goes beyond individual teacher partnerships to provide an integrated academic and CTE model. If appropriately designed, a career academy model can provide CTE teachers with a structured way to partner with core academic teachers. Collaborative models such as career academies can help CTE teachers and core academic teachers work together to further their professional growth and refine their practice to improve student outcomes.

Career academies provide a unique opportunity to combine rigorous academic content with career-based learning experiences and real-world application. Because they combine CTE and core academic coursework, career academies also can provide CTE teachers with opportunities for collaborative professional development and professional learning alongside core academic teachers. The career academy approach focuses on preparing students for college and career, as opposed to creating separate student pathways, and is usually housed within a single school or a partnership between a high school and CTE center to combine academic and career and technical curricula. A career academy has three key features:

1. A small learning community structure to create a more personalized and supportive learning environment

2. A mixture of academic and career and technical classes focused on a career theme

3. Partnerships with local employers to provide career mentorship and work-based learning opportunities (Kemple, 2008; Stern, Dayton, & Raby, 2010)

Career academies have grown in popularity in part because they have proven to be effective in improving student performance and outcomes (Bradby, Malloy, Hanna, & Dayton, 2007; Elliott, Hanser, & Gilroy, 2002; Kemple, 2008). Because career academies include business partnerships and focus on a career cluster, they give CTE teachers and core academic content teachers unique opportunities to work together in both instruction and professional improvement.

Because career academies require business partnerships, the approach requires instructional shifts in both integrating academic content and incorporating work-based learning opportunities. Districts that are adopting this approach will likely need to provide professional development to help teachers adapt to this new instructional model, including how to partner with fellow teachers, focus on student learning outcomes, and collaborate with business leaders. Career academies can, however, utilize teacher collaboration through integration of instruction and common planning time to maximize professional learning. Although teachers within a career academy model still should engage in professional development specific to their content areas, the opportunities for collaboration also can help CTE teachers and core academic teachers support each other's professional growth.

Summary and Guiding Questions

Improving ongoing professional learning opportunities for CTE teachers is important for ensuring teacher effectiveness over time. Ongoing professional learning can provide novice CTE teachers with the skills they need to be successful in the classroom, but it also can help all CTE teachers improve instructional practices and their impact on student learning. To address the ongoing needs of CTE teachers, professional development and professional learning should be linked to formative data on student learning and teacher practice, including formative evaluation results. Likewise, opportunities for professional growth should go beyond the traditional workshop or seminar format to include opportunities for collaboration between CTE teachers and core academic teachers, such as common planning time. This type of professional development and professional learning may require support from districts, such as additional time in the day, structured collaboration arrangements, additional meetings with supervisors to discuss formative data, and support for making data-driven decisions about everyday teaching practice.

The following questions are designed to help guide state-level policymakers and CTE practitioners in ensuring that the professional development policies and supports in place are aligned to the needs of CTE teachers.

- Are evaluators equipped to provide high-quality evidence-based feedback on CTE teachers' practice?

- Are formative and summative evaluation results used to identify professional learning needs and opportunities?

- Does your state or district outline priority areas or topics for professional development by Career Clusters?

- Are there opportunities for professional learning about instruction through teacher leadership, coaching, or other support structures?

- Are there opportunities for CTE teachers to share feedback about the types of professional learning supports they need to be successful?

- Does your state or district track the impact of professional development or professional learning on teacher practice or student outcomes?

- Are there successful strategies for professional learning and collaboration happening in schools in your state or district that can be implemented on a wider scale?

Glossary of Terms

An aligned human capital management system is a cohesive system in which policies and procedures on human capital management work together. An aligned human capital management system includes policies and procedures for teacher preparation, certification, recruitment, retention, induction, mentoring, evaluation, professional learning, professional development, and the educator environment. This type of aligned system creates feedback loops: for example, evaluation data describes the impact of mentoring and professional learning policies. Likewise, retention data describes the impact of the educator environment. An aligned human capital management system can bring coherence to reform efforts and ensure that policies work together to promote a high-quality workforce.

Career academies function as a school within a school, where a small subset of students typically take classes together in cohorts and different kinds of teachers come together to use a collaborative teaching model. Typically, CTE teachers, core academic teachers, and other teachers work together closely and take professional development together. Students take classes to prepare them for pursuing a bachelor's degree but also gain skills and explore roles within a field. Career academies typically also have partnerships with local business and industry. For more information, there are resources from the College and Career Academy Support Network (http://casn. berkeley.edu/) on career academies.

Career Clusters are 16 groups of occupations and industries that form part of CTE coursework at the secondary and postsecondary level. The occupations and industries in each Career Cluster are linked through common skills and knowledge required for success in these fields. Examples of Career Clusters are finance, information technology, and health science. Most CTE programs, such as career pathways and programs of study, and other policy supports, are organized by these Career Clusters. The 2008 Knowledge and Skills Statements and the Common Career Technical Core also are organized by the 16 Career Clusters. For more information, there are resources from NASDCTEc on Career Clusters (http://www.careertech.org/career-clusters/ glance/careerclusters.html).

Career pathways are defined as "series of connected education and training strategies and support services that enable individuals to secure industry relevant certification and obtain employment within an occupational area and to advance to higher levels of future education and employment in that area" (Office of Vocational and Adult Education [OVAE], 2012). Career pathways may include many aspects, but in practice they are often referred to as **programs of study**, which are a set of academic and CTE courses that lead to an industry-recognized credential or degree. Programs of study are organized by the 16 Career Clusters and, by requirements of the Perkins Act, align

secondary and postsecondary coursework and objectives, incorporate academic and CTE content, and allow secondary students to take postsecondary coursework as applicable. Secondary students often can use **dual enrollment**, in which they receive secondary credit for postsecondary coursework, to shorten the amount of time necessary to earn a degree. It is important to note that one of the main charges of the NCiCTE (http://ctecenter.ed.gov/) is to find innovative ways to strengthen partnerships and connections between secondary and postsecondary institutions for programs of study. More information is available in the resources from NRCCTE (http://www.nrccte.org/core-issues/programs-study), the Perkins Collaborative Resource Network (http://cte.ed.gov/nationalinitiatives/advancing_cte.cfm), and OVAE (http://www2.ed.gov/about/offices/list/ovae/ten-attachment.pdf) on programs of study.

Career-ready practices are a set of 12 overarching knowledge, skills, and dispositions that contribute to the career readiness of students in CTE programs. Career-ready practices are integrated as part of the Common Career Technical Core, but they are useful to all students, not just CTE students. For more information, there are resources from NASDCTEc (http://www.careertech.org/career-technical-education/cctc/careerreadypractices.html) on career-ready practices.

The Common Career Technical Core is a set of standards for CTE. These standards are similar to the Common Core State Standards in that they are rigorous and relevant to today's students. The Common Career Technical Core initiative is coordinated by NASDCTEc in conjunction with 42 states, the District of Columbia, and Palau, which helped to develop these standards. States may choose to voluntarily adopt the Common Career Technical Core or align their existing CTE standards to it. For more information, NASDCTEc (http://www.careertech.org/career-technical-education/cctc/info.html) hosts a variety of resources on its website.

Dual enrollment is a program in which secondary students take CTE courses at the postsecondary level that allow them to earn both secondary and postsecondary credit. See **Career pathways** for more information.

Employability skills are commonly thought of as the skills that are increasingly necessary for success in all fields and industries, such as critical thinking and communications skills. The Employability Skills Framework (http://cte.ed.gov/employabilityskills/) provides a variety of resources, such as an interactive framework, online tool, and state examples, which were developed through OVAE. Likewise, the Partnership for 21st Century Skills (http://www.p21.org/) has developed a framework for student outcomes that integrates these types of skills with content knowledge, interdisciplinary knowledge, core subject knowledge, life and career skills, and media skills.

Induction programs support the professional growth of new teachers. Examples of these programs are summer sessions that are primarily an orientation to district policies and programs that include ongoing mentoring, formative feedback on practice, and professional learning. Induction programs in districts across the country vary in quality, scope, and impact. **Mentoring** programs often are similar to comprehensive induction programs, although they may include struggling veteran teachers as well as new teachers. For more information, the New Teacher Center (http://www.newteachercenter.org/induction-programs) has a number of resources on mentoring and induction programs, including a model for high-quality induction programs.

Industry certification credentials are certificates students can earn reflecting their skills and knowledge within a specific field. These credentials sometimes fulfill the requirement for assessments of students' skill attainment in programs of study but also provide students with meaningful credentials for employment. For more information, NRCCTE (http://www.nrccte.org/core-issues/industry-recognized-credentials) has research-based resources on industry certification credentials.

Interrater reliability is the degree to which multiple evaluators (raters) give relatively similar ratings to similar, observable situations. For teacher evaluations, it is critical that evaluators have a high enough degree of interrater reliability to ensure that evaluations done by different evaluators for a wide variety of educators are fair and accurate. For more information, the Center for Educator Compensation Reform (CECR) (http://www.cecr.ed.gov/researchSyntheses/34008_CECR_RS_Inter_Rater_measurement_508.pdf) has a brief on interrater reliability within teacher evaluations.

Knowledge and Skills Statements are the standards developed in 2008 for each of the Career Clusters. The knowledge and skill statements are similar to the Common Career Technical Core, which has replaced them as the primary content standards for CTE.

The National Association of State Directors of Career Technical Education Consortium (NASDCTEc) is an advocacy organization that represents state CTE directors and other CTE leaders. NASDCTEc provides a wide variety of resources to the field, supports and advocates for critical CTE issues nationally, and provides leadership and support for the National Career Clusters Framework.

The National Center for Innovation in Career and Technical Education (NCiCTE) is a national research center funded through the U.S. Department of Education, charged with assessing how high-quality career and technical education programs can have an impact and improve secondary and postsecondary instruction. The original national research center on CTE began as the National Center for Research in Vocational Education (NCRVE) at Ohio State University in 1978 and has been rebid a number

of times, leading to the current iteration of the center as NCiCTE. NCiCTE conducts research and evaluation but also provides resources and training to the field. For more information, please see the NCiCTE website (http://ctecenter.ed.gov/).

The National Research Center for Career and Technical Education (NRCCTE) is a national research center, which was funded through the Office of Vocational and Adult Education (OVAE) from 2007 to 2012 and currently is administered by the University of Louisville. The University of Louisville, in consortium with other universities and partner organizations, provides evidence-based solutions to many issues in CTE. For more information, see the NRCCTE website (http://www.nrccte.org/).

Nontested grades and subjects are the grades and subjects in K–12 education that are not assessed through standardized assessments, such as a statewide reading and mathematics assessment, for older elementary and middle school students. There are challenges in measuring student learning for teachers of nontested grades and subjects because they are not captured in value-added or student growth percentile measures; there are, however, many promising approaches, such as student learning objectives, for measuring these teachers' contributions to student learning. For more information, the GTL Center has resources on teachers of nontested subjects and grades (http://www.gtlcenter.org/sites/default/files/docs/MeasuringTeachers Contributions.pdf), as well as resources on student learning objectives (http://www.gtlcenter.org/tools-publications/online-tools/student-learning-objectives).

A peer assistance and review (PAR) program is a collaboration between a school district and the local union to provide new and/or struggling teachers with support. PAR was first implemented in Toledo Public Schools in the early 1980s, which has served as a model for several other PAR programs in other districts across the country. In PAR programs, exemplar teachers move out of the classroom for a set number of years to serve as mentors and coaches to teachers in the PAR program, usually called consulting teachers. Consulting teachers then present recommendations for continued employment or dismissal of these teachers to a PAR panel, which includes both district and union representatives. For more information, the Harvard Graduate School of Education (http://www.gse.harvard.edu/~ngt/par/) has a variety of comprehensive resources on PAR.

The Perkins Act is a federal law meant to support career and technical education. The Perkins Act began in 1917 as the Smith-Hughes Act and was authorized in 1984 as the Carl D. Perkins Vocational and Technical Education Act, which continued funding for vocational and technical education. States receive federal funds, which they are responsible for disseminating, through Title I or Title II funding from Perkins. The original version of the Perkins Act was reauthorized in 1998 before it underwent significant revisions in 2006 to become the Carl D. Perkins Career and Technical

Education Act. Beyond changing the name, the law stipulates state funding allocations and accountability for student outcomes, including a requirement for the integration of academic content in CTE courses. In 2012, the Obama Administration released its Blueprint for Transforming Career and Technical Education, which outlines its priorities for the next Perkins reauthorization. For more information, consult resources from NASDCTEc (http://www.careertech.org/legislation/perkins/) and the Perkins Collaborative Resource Network (http://cte.ed.gov/) on the Perkins Act.

Portfolios used in teacher evaluations are collections of artifacts, information, and data on teacher practice that may not be observable. For more information, there are resources and examples of portfolios in teacher evaluation systems from the GTL Center (http://resource.tqsource.org/gep/GEPEvalType.aspx?tid=3).

Professional learning models focus on teacher learning and development through formative data feedback. Professional learning models provide opportunities for professional learning and development that are connected to everyday teaching practice, formative classroom-level data, and school-level standards and goals. For more information, the GTL Center (http://www.gtlcenter.org/tools-publications/publications) has a number of resources on professional learning.

Programs of study: See **Career pathways.**

Student learning objectives (SLOs) are used to measure a teacher's contribution to student learning in teacher evaluations. SLOs include at least one data-driven student performance goal and measure, although instructional design and context may call for SLOs with multiple goals and measures. SLOs may be used for a variety of educators, including administrators, and are usually designed by teachers or school leaders and reviewed for validity. For more information, the GTL Center (http://www.gtlcenter.org/tools-publications/online-tools/student-learning-objectives) has an SLO resource library.

Validity in teacher evaluations is the extent to which both measures and summative ratings are accurate and appropriate reflections of teacher performance. For more information, the MET Project (http://www.metproject.org/) has resources on validity in teacher evaluations.

References

Achieve. (2012). *Common Core State Standards and career and technical education: Bridging the divide between college and career readiness.* Washington, DC: Author. Retrieved from http://www.achieve.org/files/CCSS-CTE-BridgingtheDivide.pdf

Adams, E. (2010). A framework for the preparation of accomplished career and technical education teachers. *Journal of Career and Technical Education, 25*(1), 21–34. Retrieved from http://scholar.lib.vt.edu/ejournals/JCTE/v25n1/pdf/adams.pdf

Association for Career and Technical Education. (n.d.). *CTE today fact sheet.* Alexandria, VA: Author.

Asunda, P. A. (2011). Career and technical education teacher preparation trends: A pilot study. *Online Journal for Workforce Education and Development, 5*(3), 1–26. Retrieved from: http://opensiuc.lib.siu.edu/cgi/viewcontent.cgi?article=1107&context=ojwed

Bazile, S. A., & Walter, R. A. (2009). Certification of postsecondary career and technical instructors: Issues for debate. *Journal of Industrial Teacher Education, 45*(3), 105–112. Retrieved from http://scholar.lib.vt.edu/ejournals/JITE/v45n3/pdf/bazile.pdf

Bel Hadj Amor, H., Tucker, N., & Ozek, U. (2013). *Determining attribution: Holding teachers accountable for student growth.* Washington, DC: American Institutes for Research, Value-Added Measurement Services. Retrieved from http://www.air.org/files/VAMS/Determining_Attribution.pdf

Bonsu, P., Bowman, N., Francis, C. D., Larsen, E., & Polar, R. (2013). *Career and technical education teacher licensure requirements: 50 states and the District of Columbia.* Chicago: Midwest Comprehensive Center.

Bottoms, G., Egelson, P., Sass, H., & Uhn, J. (2013). *Improving the quality of career and technical alternative teacher preparation: An induction model and professional development support.* Louisville, KY: University of Louisville, National Research Center for Career and Technical Education. Retrieved from http://www.nrccte.org/sites/default/files/publication-files/nrccte_sreb_alternative_certification.pdf

Bottoms, G., & McNally, K. (2005). *Actions states can take to place a highly qualified career/technical teacher in every classroom.* Atlanta: Southern Regional Education Board. Retrieved from http://publications.sreb.org/2005/05V73_career_tech_state_actions.pdf

Bradby, D., Malloy, A., Hanna, T., & Dayton, C. (2007). *A profile of the California partnership academies 2004–2005.* Berkeley, CA: ConnectEd and the Career Academy Support Network. Retrieved from http://www.connectedcalifornia.org/downloads/LL_CA_Partnerships.pdf

Bruening, T. H., Scanlon, D. C., Hodes, C., Dhital, P., Shao, X., & Liu, S. T. (2001). *Characteristics of teacher educators in career and technical education.* Columbus, OH: National Dissemination Center for Career and Technical Education. Retrieved from http://www.nrccte.org/sites/default/files/publication-files/char_of_tchr_ed_in_cte.pdf

Bureau of Labor Statistics. (2013). *Career and technical education teachers.* Washington, DC: Author. Retrieved from http://www.bls.gov/ooh/education-training-and-library/career-and-technical-education-teachers.htm

Cannon, J. G., Kitchel, A., Duncan, D. W., & Arnett, S. E. (2011). Professional development needs of Idaho technology teachers: Teaching and learning. *Journal of Career and Technical Education, 26*(1), 32–47. (ERIC Document Reproduction Service No. EJ940548). Retrieved from http://files.eric.ed.gov/fulltext/EJ940548.pdf

Career Readiness Partner Council. (2013). *Building blocks for change: What it means to be career ready.* Silver Spring, MD: Author. Retrieved from http://www.careerreadynow.org/docs/CRPC_4pager.pdf

Carl D. Perkins Career and Technical Education Improvement Act of 2006 (Perkins IV), Pub L. No. 109-270. Retrieved from http://www.gpo.gov/fdsys/pkg/BILLS-109s250enr/pdf/BILLS-109s250enr.pdf

Carnevale, A. P., Smith, N., & Strohl, J. (2010). *Help wanted: Projections of jobs and education requirements through 2018.* Washington, DC: Georgetown University, Center on Education and the Workforce. http://www9.georgetown.edu/grad/gppi/hpi/cew/pdfs/FullReport.pdf

Carnevale, A. P., Smith, N., & Strohl, J. (2013). *Recovery: Job growth and education requirements through 2020.* Washington, DC: Georgetown University, Center on Education and the Workforce. http://www9.georgetown.edu/grad/gppi/hpi/cew/pdfs/Recovery2020.FR.Web.pdf

Center on Great Teachers and Leaders. (2013). *Database of teacher and principal evaluation policies.* Washington, DC: Author. Retrieved from http://resource.tqsource.org/stateevaldb/

Coggshall, J. G., Rasmussen, C., Colton, A., Milton, J., & Jacques, C. (2012). *Generating teaching effectiveness: The role of job-embedded professional learning in teacher evaluation.* Washington, DC: National Comprehensive Center for Teacher Quality. Retrieved from http://www.gtlcenter.org/sites/default/files/docs/GeneratingTeachingEffectiveness.pdf

Cohen, M., & Besharov, D. J. (2002). *The role of career and technical education: Implications for the federal government.* Washington, DC: U.S. Department of Education, Office of Vocational and Adult Education. Retrieved from http://www2.ed.gov/about/offices/list/ovae/pi/hs/besharov.doc

Conneely, N., & Uy, E. *Teacher shortage undermines CTE.* Silver Spring, MD: National Association of State Directors of Career Technical Education Consortium. Silver Spring, MD: Author. Retrieved from https://www.google.com/rl?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CDsQFjAA&url=http%3A%2F%2Fwww.careertech.org%2Ffile_download%2Fbdd4aaf3-c48b-43dc-b316-87f7f59d99a8&ei=X1l0UeykLubF0AGQ5oHwBg&usg=AFQjCNFsvk5JCuMqkbcaZtIRgqlLl6QnsA&sig2=u48EaF6CFd3E0AP5XVjEKQ&bvm=bv.45512109,d.dmQ

Constantine, J., Player, D., Silva, T., Hallgren, K., Grider, M., Deke, J., & Warner, E. (2009). *An evaluation of teachers trained through different routes to certification: Final Report, Executive Summary* (NCEE 2009-4044). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance. Retrieved from http://ies.ed.gov/ncee/pubs/20094043/pdf/20094044.pdf

Cramer, K. (2004). *The vocational teacher pipeline: How academically well-prepared is the next generation of vocational teachers?* Washington, DC: U.S. Department of Education, Office of the Deputy Secretary, Policy and Program Studies Service. Retrieved from http://www2.ed.gov/rschstat/eval/sectech/nave/pipeline-2004.pdf

Drage, K. (2010). Professional development: Implications for Illinois career and technical education teachers. *Journal of Career and Technical Education, 25*(2), 24–37. (ERIC Document Reproduction Service No. EJ931094). Retrieved from http://files.eric.ed.gov/fulltext/EJ931094.pdf

Duncan, A. (2011). *The new CTE: Secretary Duncan's remarks on career and technical education* [Press release]. Retrieved from http://www.ed.gov/news/speeches/new-cte-secretary-duncans-remarks-career-and-technical-education

Elliott, M. N., Hanser, L. M., & Gilroy, C. L. (2002). Career academies: Additional evidence of positive student outcomes. *Journal of Education for Students Placed at Risk 7*(1), 71–90. (ERIC Document Reproduction Service No. EJ640279). doi: 10.1207/S15327671ESPR0701_5

Feistritzer, C. E. (2011). *Profile of teachers in the U.S. 2011.* Washington, DC: National Center for Education Information. Retrieved from http://www.edweek.org/media/pot2011final-blog.pdf

Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal, 38*(4), 915–945. (ERIC Document Reproduction Service No. EJ648260)

Gaunt, D., & Palmer, L. B. (2005, November/December). Positive student attitudes toward CTE. *Techniques, 80*(8), 44–47.

Gentry, M., Peters, S. J., & Mann, R. L. (2007). Differences between general and talented students' perceptions of their career and technical education experiences compared to their traditional high school experiences. *Journal of Advanced Academics, 18*(3), 372–401. (ERIC Document Reproduction Service No. EJ773183)

Gentry, M., Rizza, M. G., Peters, S., & Hu, S. (2005). Professionalism, sense of community and reason to learn: Lessons from an exemplary career and technical education center. *Career and Technical Education Research, 30*(1), 47–85. (ERIC Document Reproduction Service No. EJ729704)

Goe, L., & Holdheide, L. (2011). *Measuring teachers' contributions to student learning growth for nontested grades and subjects.* Washington, DC: National Comprehensive Center for Teacher Quality. Retrieved from http://www.gtlcenter.org/sites/default/files/docs/MeasuringTeachersContributions.pdf

Hammond, C., Drew, S. F. Withington, C. Griffith, Swiger, C. M., Mobley, C.,…Daugherty, L. (2013). *Programs of study as a state policy mandate: A longitudinal study of the South Carolina Personal Pathways to Success Initiative—Final technical report: Major findings and implications.* Louisville, KY: University of Louisville, National Research Center for Career and Technical Education. Retrieved from http://nrccte.org/sites/default/files/publication-files/nrccte_sc_personal_pathways_final_report.pdf

Harvard Graduate School of Education. (2012). *A user's guide to peer assistance and review.* Cambridge, MA: Author. Retrieved from http://www.gse.harvard.edu/~ngt/par/

Headrick, N., & Bottoms, G. (2012). *Career/technical education teacher preparation project: A fast-track model.* Atlanta: Southern Regional Education Board. Retrieved from http://www.nrccte.org/sites/default/files/publication-files/nrccte-sreb_alternative_certification.pdf

Hill, H. C., Charalambos, C. Y., & Kraft, M. A. (2012). When rater reliability is not enough: Teacher observation systems and a case for the generalizability study. *Educational Researcher, 41*(2), 56–64. Retrieved from http://www.gse.harvard.edu/cepr-resources/files/news-events/ncte-rater-reliability-not-enough-hill-charlambous-kraft.pdf

Holdheide, L. (2013). *Inclusive design: Building educator evaluation systems that support students with disabilities.* Washington, DC: Center on Great Teachers and Leaders. Retrieved from http://www.gtlcenter.org/sites/default/files/GTL_Inclusive_Design.pdf

Johnson, S. M., Fiarman, S. E., Munger, M. S., Papay, J. P, Qazilbash, E. K., & Wheeler, L. (2009). *A user's guide to peer assistance and review.* Cambridge, MA: Harvard Graduate School of Education. Retrieved from http://www.gse.harvard.edu/~ngt/par/resources/users_guide_to_par.pdf

Kemple, J. J. (2008). *Career academies: Long-term impacts on labor market outcomes, educational attainment, and transitions to adulthood.* New York: MDRC. Retrieved from http://www.mdrc.org/sites/default/files/full_50.pdf

Kerna, K. D. (2012). Help wanted: Professional development and training for career and technical education faculty. *International Journal of Vocational and Technical Education, 4*(3), 38–45. doi: 10.5897/IJVTE11.035 Retrieved from http://academicjournals.org/article/article1379424639_Kerna.pdf

Lombardi, M. M. (2007). *Authentic learning for the 21st century: An overview.* Louisville, CO: Educause. Retrieved from http://net.educause.edu/ir/library/pdf/eli3009.pdf

Marion, S., & Buckley, K. (2011). *Approaches and considerations for incorporating student performance results from non-tested grades and subjects into educator effectiveness determinations.* Dover, NH: National Center for the Improvement of Educational Assessment. Retrieved from http://www.nciea.org/publications/Considerations%20for%20non-tested%20grades_SMKB2011.pdf

MET Project, Bill and Melinda Gates Foundation. (2013). *Ensuring fair and reliable measures of effective teaching: Culminating findings from the MET Project's three-year study.* Seattle, WA: Author. Retrieved from http://metproject.org/downloads/MET_Ensuring_Fair_and_Reliable_Measures_Practitioner_Brief.pdf

National Association of State Directors of Career Technical Education Consortium. (2008). *2008 knowledge and skills* [Webpage]. Retrieved from http://www.careertech.org/career-clusters/ccresources/knowledge-skills.html

National Association of State Directors of Career Technical Education Consortium. (2012). *A look inside: A synopsis of CTE trends.* Silver Spring, MD: Author. Retrieved from https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&ved=0CEoQFjAC&url=http%3A%2F%2Fwww.careertech.org%2Ffile_download%2Fe0a9aaba-0e50-4dd6-a39f-70529836d8d4&ei=X1l0UeykLubF0AGQ5oHwBg&usg=AFQjCNHbPp5tRu8OekRCMbFhb-ALsomZtQ&sig2=8OSHw4shvfCpEVH9WWQg5g&bvm=bv.45512109,d.dmQ

National Center for Education Statistics. (2008). *Career/technical education (CTE) statistics* [Webpage]. Retrieved from http://nces.ed.gov/surveys/ctes/tables/index.asp?LEVEL=SECONDARY

National Center for Innovation in Career and Technical Education. (2013). *ACTE policy seminar.* Alexandria, VA: Association for Career and Technical Education. Retrieved from https://www.acteonline.org/uploadedFiles/Assets_and_Documents/Global/files/Events/NPS/NationalCenterforInnovation-NPS13.pdf

National Research Center for Career and Technical Education, College of Education and Human Development, University of Louisville. (2011). *Improving secondary career and technical education through professional development: Alternative certification and use of technical assessment data.* Louisville, KY: Author. Retrieved from http://www.nrccte.org/sites/default/files/publication-files/improving_ed_through_pd.pdf

National Research Center for Career and Technical Education, College of Education and Human Development, University of Louisville. (2012). *Professional development* [Webpage]. Retrieved from http://www.nrccte.org/professional-development

O'Connor, P. J. (2012). The professional development needs of academic teachers adding career-technical education licenses. *Journal of Career and Technical Education, 27*(1), 34–47. Retrieved from http://scholar.lib.vt.edu/ejournals/JCTE/v27n1/pdf/oconnor.pdf

Office of Vocational and Adult Education. (2012). *CP joint letter.* Washington, DC: U.S. Department of Education. Retrieved from http://www2.ed.gov/about/offices/list/ovae/ten-attachment.pdf

Papay, J. P., & Johnson, S. M. (2012). Is PAR a good investment? Understanding the costs and benefits of teacher peer assistance and review programs. *Educational Policy, 26*(5), 696–729. (ERIC Document Reproduction Service No. EJ975887). doi: 10.1177/0895904811417584

Rothwell, J. (2013). *The hidden STEM economy.* Washington, DC: Brookings Institution. Retrieved from http://www.brookings.edu/~/media/research/files/reports/2013/06/10%20stem%20economy%20rothwell/thehiddenstemeconomy610.pdf

Ruhland, S. K., & Bremer, C. D. (2002). Professional development needs of novice career and technical education teachers. *Journal of Career and Technical Education, 19*(1), 18–31. (ERIC Document Reproduction Service No. EJ660464). Retrieved from http://files.eric.ed.gov/fulltext/EJ660464.pdf

Ruhland, S. K., & Bremer, C. D. (2004). *Alternative teacher certification procedures and professional development opportunities for career and technical education teachers.* Louisville, KY: University of Louisville, College of Education and Human Development, National Research Center for Career and Technical Education. Retrieved from http://www.teach-now.org/frmRsr_RhulandStudyMNAlternative.pdf

Skidmore, K., & Headrick, N. (2013). *Improving the transition to teaching for career/technical teachers entering through alternative routes.* Louisville, KY: University of Louisville, National Research Center for Career and Technical Education. Retrieved from http://www.careertech.org/file_download/f9add8af-82a1-49f6-83e1-9d223a81577c.pdf

Stern, D., Dayton, C., & Raby, M. (2010). *Career academies: A proven strategy to prepare high school students for college and careers.* Berkeley: University of California, Career Academy Support Network. Retrieved from https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=4&ved=0CE8QFjAD&url=https%3A%2F%2Fwww.acteonline.org%2FuploadedFiles%2FAssets_and_Documents%2FGlobal%2Ffiles%2FPolicy%2FCareer_Academies_a_Proven_Strategy.doc&ei=HekTUrTPE7L9yAHK8oGwBw&usg=AFQjCNE4nLl31bal–4ggrnrUhjhetZMFg&sig2=wWux1EukaGoAOtjosAkfvw&bvm=bv.50952593,d.aWc

Sturko, P. A., & Gregson, J. A. (2009). Learning and collaboration in professional development for career and technical education teachers: A qualitative multi-case study. *Journal of Industrial Teacher Education, 45*(3), 34–60. (ERIC Document Reproduction Service No. EJ865353). Retrieved from http://files.eric.ed.gov/fulltext/EJ865353.pdf

U.S. Department of Education. (2012). *Investing in America's future: A blueprint for transforming career and technical education.* Washington, DC: Author. Retrieved from http://www2.ed.gov/about/offices/list/ovae/pi/cte/transforming-career-technical-education.pdf

Walter, R. A., & Gray, K. C. (2002). Teacher preparation/licensure in career and technical education: A public policy analysis. *Journal of Vocational Education Research, 27*(1), 131–153.

Appendix. Additional Resources

Alfeld, C. (2010, January). POS: Observations on process and structure. *Techniques*, 52–55. Retrieved from http://niwl.fhi360.org/pdfs/Programs_of_Study.pdf

Alfeld, C., & Bhattacharya, S. (2012). Mature programs of study: A structure for the transition to college and career? I*nternational Journal of Educational Reform, 21*(2), 119–137. Retrieved from http://www.nrccte.org/sites/default/files/external-reports-files/12-008_ijer_v21_no2_fnls_0.pdf

Aliaga, O. A. (n.d.). *Vanguard practices in CTE* [Webpage]. Louisville, KY: University of Louisville, National Research Center for Career and Technical Education. Retrieved from http://www.nrccte.org/resources/studies/vanguard-practices-cte

Arnett, S. E., Kozlowski, P., Peach, P., & Varela, E. (2009, September). Career and technical education: Pursuing a pipeline for the new green collar workforce. *Techniques*, pp. 36–39. (ERIC Document Reproduction Service No. EJ858229). Retrieved from http://files.eric.ed.gov/fulltext/EJ858229.pdf

Association for Career and Technical Education. (2007). *Career and technical education's role in dropout prevention and recovery.* Alexandria, VA: Author.

Association for Career and Technical Education. (2013). *What is CTE?* Alexandria, VA: Author. Retrieved from https://www.acteonline.org/general.aspx?id=120#.UXRUdiv5mKw

Castellano, M., Stone, J. R. III., Stringfield, S., Farley, E. N., & Wayman, J. C. (2004). *The effect of CTE-enhanced whole-school reform on student coursetaking and performance in English and science.* St. Paul: University of Minnesota, National Research Center for Career and Technical Education. Retrieved from http://www.nrccte.org/sites/default/files/publication-files/english_science_castellano.pdf

Castellano, M., Sundell, K., Overman, L. T., & Aliaga. O. A. (2012). Do career and technical education programs of study improve student achievement? Preliminary analyses from a rigorous longitudinal study. *International Journal of Educational Reform, 21*(2), 98–118. Retrieved from http://www.nrccte.org/sites/default/files/external-reports-files/12-008_ijer_v21_no2_fnls_0.pdf

Custer, R. L., Schell, J. W., McAlister, B. D., Scott, J. L., & Hoepfl, M. (2000). *Using authentic assessment in vocational education.* Columbus: Ohio State University, College of Education, ERIC Clearing House on Adult, Career, and Vocational Education. (ERIC Document Reproduction Service No. ED440293). Retrieved from http://files.eric.ed.gov/fulltext/ED440293.pdf

Davis, J. L. (2006). Adopting industry skill standards can strengthen CTE. *Tech Directions, 60*(3), 22–23.

Foster, J., Kelley, P., Pritz, S., & Hodes, C. (2011, April). CTE's focus on continual improvement. *Techniques*, 28–31. (ERIC Document Reproduction Service No. EJ926089). Retrieved from http://files.eric.ed.gov/fulltext/EJ926089.pdf

Foster, J., Pritz, S., Kelley, P., & Hodes, C. (n.d.). *Professional development for educators on the use of assessment data.* Louisville, KY: University of Louisville, National Research Center for Career and Technical Education. Retrieved from http://www.nrccte.org/sites/default/files/publication-files/nocti_professional_development_year_4.pdf

Gaunt, D. P. (2005). *High school seniors' perceptions of career and technical education and factors influencing their decision to attend an area career technical center* (Unpublished doctoral dissertation). Western Michigan University, Kalamazoo.

Gray, K. (2004). Is high school career and technical education obsolete? *Phi Delta Kappan, 86*(2), 128–134. Retrieved from http://www.kappanmagazine.org/content/86/2/128.full.pdf

Green, K. (2012, September). Common career technical core: Common standards, common vision for CTE. *Techniques, 87*(6), 44–47.

Haag, P. W. (2012, October 28). *The challenges of career and technical concurrent enrollment* (Slide presentation). Paper presented at the National Conference of the National Alliance of Concurrent Enrollment Partnerships, Seattle, WA. Retrieved from http://www.nacep.org/docs/news/conference-archives/conference-archives-2012/NACEP2012_P2_Haag.pdf

Hughes, C., Hollems, D., Korey, S., & Chavez, L. (2011, March). *CTE dual enrollment: Preparing students for college and careers* [Slide presentation]. Presented at the Spring Conference of the California Community College Association for Occupational Education, Oakland, CA. Retrieved from http://www.careerladdersproject.org/wp-content/uploads/2011/10/CTE-DE-CCCAOE-2011.pdf

Kemple, J. J. (2001). *Career academies: Impacts on students' initial transitions to post-secondary education and employment.* New York: MDRC. Retrieved from http://www.mdrc.org/sites/default/files/full_47.pdf

Kolb, D. A. (1984). *Experiential learning: experience as the source of learning and development.* Upper Saddle River, NJ: Prentice Hall.

Kotamraju, P. (2010). A new direction for CTE accountability and evaluation. *Techniques, 85*(3), 50–53.

Kotamraju, P., & Kelly, D. (2009). *Inventory of technical skills assessments* [Project summary]. Louisville, KY: University of Louisville, National Research Center for Career and Technical Education. Retrieved from http://www.nrccte.org/sites/default/files/publication-files/inventory_technical_skills_assessments.pdf

Kotamraju, P., & Mettille, J. L. III. (2012). *Using return on investment (ROI) and other related tools: Guidelines for measuring career and technical education (CTE) internal efficiency and external effectiveness.* Louisville, KY: University of Louisville, National Research Center for Career and Technical Education. Retrieved from http://www.nrccte.org/sites/default/files/publication-files/nrccte_roi_guidebook_web.pdf

Kotamraju, P., & Steuernagel, B. (n.d.). *The crosswalk validation project.* Louisville, KY: University of Louisville, National Research Center for Career and Technical Education. Retrieved from http://www.nrccte.org/resources/studies/crosswalk-validation-project

Kotamraju, P., & Steuernagel, B. (2012). *The crosswalk validation project: Final report.* Louisville, KY: University of Louisville, National Research Center for Career and Technical Education. Retrieved from http://www.nrccte.org/sites/default/files/uploads/nrccte_crosswalk_validation_final_report.pdf

Laird, J., Chen, X., Levesque, K., & Owings, J. (2006). *The postsecondary educational experiences of high school career and technical education concentrators: Selected results from the NELS:88/2000 Postsecondary Education Transcript Study (PETS) 2000* (NCES 2006-309rev). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics.

Lambeth, J. M. (2008). *Research foci for career and technical education: Findings from a national Delphi study* (Unpublished doctoral dissertation). Texas A & M University, College Station. Retrieved from http://repository.tamu.edu/bitstream/handle/1969.1/ETD-TAMU-2864/LAMBETH-DISSERTATION.pdf?sequence=1

Lambeth, J. M., Elliot, J., & Joerger, R. (2008, October). The national career and technical education research agenda. *Techniques*, 50–53.

Minnesota State Colleges and Universities. (2013). *CTE professional development* [Webpage]. Retrieved from http://cte.mnscu.edu/professionaldevelopment/

National Alliance of Concurrent Enrollment Partnerships. (n.d.). *Increasing concurrent enrollment opportunities for CTE students with programs of study.* Chapel Hill, NC: Author. Retrieved from http://www.nacep.org/docs/news/conference-archives/conference-archives-2010/NACEP_Conference2010_Volker.pdf

National Alliance of Concurrent Enrollment Partnerships. (2013). *Standards* [Webpage]. Retrieved from http://nacep.org/standards/

National Association of State Directors of Career Technical Education Consortium. (2010). *Reflect, transform, lead: A new vision for career technical education.* Silver Spring, MD: Author.

National Research Center for Career and Technical Education, College of Education and Human Development, University of Louisville. (n.d.). *CTE teacher alternative certification induction model.* Louisville, KY: Author.

National Research Center for Career and Technical Education, College of Education and Human Development, University of Louisville. (n.d.). *Evidence-based approaches to improving CTE programs: Preparing college and career ready students.* Louisville, KY: Author. Retrieved from http://www.nrccte.org/sites/default/files/publication-files/brochure-_pd.pdf

National Research Center for Career and Technical Education, College of Education and Human Development, University of Louisville. (n.d.). *Professional development* [Webpage]. Retrieved from http://www.nrccte.org/professional-development

National Research Center for Career and Technical Education, College of Education and Human Development, University of Louisville. (2010). *Professional development for secondary career and technical education: Implications for change.* Louisville, KY: Author. Retrieved from http://www.nrccte.org/UserFiles/File/Tech_Reports/Professional_Development_Joint_2010.pdf

National Research Council. (2010). *Preparing teachers: Building evidence for sound policy.* Washington, DC: Author.

NAVE Independent Advisory Panel. (2004). *Earning, learning, and choice career and technical education: Career and technical education works for students and employers.* Washington, DC: U.S. Department of Education, National Assessment of Vocational Education.

Packard, B. W., Leach, M., Ruiz, Y., Nelson, C., & DiCocco, H. (2012). School-to-work transition of career and technical education graduates. *Career Development Quarterly, 60*, 134–144.

Park, T., Pearson, D., & Sawyer, J. (2011). Changing approaches—changing perspectives. *Techniques*, 20–23.

Plank, S. (2001). A question of balance: CTE, academic courses, high school persistence, and student achievement. *Journal of Vocational Education Research, 26*, 279–327.

Renzulli, J. S., Gentry, M., & Reis, S. M. (2004). A time and place for authentic learning. *Educational Leadership, 26*, 73–77.

RTI International. (2013). *National Center for Innovation in Career and Technical Education* [Webpage]. Retrieved from http://www.rti.org/page.cfm?objectid=4B1F0431-5056-B100-0C591A1371629C33

Sass, H. B. (2011, April). Advancing a new image of CTE via high-quality teacher preparation. *Techniques, 86*(4), 24–27. (ERIC Document Reproduction Service No. EJ926085). Retrieved from http://files.eric.ed.gov/fulltext/EJ926085.pdf

Shumer, R., Stringfield, S., & Stipanovic, N. (2013). *Programs of study: A cross-study examination of programs in three states.* Louisville, KY: University of Louisville, National Research Center for Career and Technical Education. Retrieved from http://www.nrccte.org/resources/studies/programs-study-cross-study-examination-programs-three-states

Silverberg, M., Warner, E., Fong, M., & Goodwin, D. (2004). *National assessment of vocational education: Final report to Congress.* Washington, DC: U.S. Department of Education, Office of the Under Secretary, Policy and Program Studies Service.

Stiggins, R. (2004). New assessment beliefs for a new school mission. *Phi Delta Kappan, 86*(1), 22–27.

Stipanovic, N., Lewis, M. V., & Stringfield, S. (2012). Situating programs of study within current and historical career and technical educational reform efforts. *International Journal of Educational Reform, 21*(2), 80–97. Retrieved from http://www.nrccte.org/sites/default/files/external-reports-files/12-008_ijer_v21_no2_fnls_0.pdf

Stone, J. R. III. (2009). A Perkins challenge: Assessing technical skills in CTE. *Techniques, 84*(2), 21–23. (ERIC Document Reproduction Service No. EJ832407). Retrieved from http://files.eric.ed.gov/fulltext/EJ832407.pdf

Tennessee Department of Education. (n.d.). *CTE professional development* [Webpage]. http://www.tn.gov/education/cte/CTEProfessionalDevelopment.shtml

Valentine, J. C., Hirschy, A. C., Bremer, C. D., Novillo, W., Castellano, M., & Banister, A. (2009). *Systematic reviews of research: Postsecondary transitions—identifying effective models and practices.* Louisville, KY: University of Louisville, National Research Center for Career and Technical Education. Retrieved from http://nrccte.education.louisville.edu/UserFiles/File/pubs/Valentine_Postsecondary_Transitions.pdf

Washer, B., & Cochran, L. (2012). Performance assessment in CTE: Focusing on the cognitive, psychomotor, and affective domains. *Techniques*, 30–34.

Washington State Workforce Training and Education Coordinating Board. (2013). *Recommendations regarding the U.S. Department of Education's Blueprint for Transforming Career and Technical Education.* Retrieved from http://www.wtb.wa.gov/Documents/Tab3-PerkinsSupportforMultiplePathwaysCombined.pdf

Willcox, G. R., & Bazdar, S. L. (2011, October). *Governor's STEM academies in Virginia* [Slide presentation]. Presented at the NACEP Annual Conference, Mystic, CT. Retrieved from http://www.nacep.org/docs/news/conference-archives/conference-archives-2011/NACEP_Conference2011_Bazdar.pdf

Withington, C., Hammond, C., Mobley, C., Stipanovic, N., Sharp, J. L., Stringfield, S., & Drew, S. F. (2012). Implementing a statewide mandated career pathways/programs of study school reform model: Select findings from a multisite case study. *International Journal of Educational Reform, 21*(2), 138–158. Retrieved from http://www.nrccte.org/sites/default/files/external-reports-files/12-008_ijer_v21_no2_fnls_0.pdf

Zirkle, C. J., Martin, L., & McCaslin, N. L. (2007). *Study of state certification/licensure requirements for secondary career and technical education teachers.* Louisville, KY: University of Louisville, National Research Center for Career and Technical Education. Retrieved from: http://www.nrccte.org/sites/default/files/publication-files/state_certification_secondary_teachers_0.pdf

AIR®
AMERICAN INSTITUTES FOR RESEARCH®

www.air.org

1430_2/14