

COLLEGE & CAREER READINESS & SUCCESS Center

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How Career and Technical Education Can Help Students Be College and Career Ready: A Primer

Today's economy demands a better educated workforce than ever before, and jobs in this new economy require more complex knowledge and skills than the jobs of the past. Research from the Center for Education and the Workforce at Georgetown University debunks the oft-cited myth that the economy lacks jobs for young people to fill, finding instead that industries across the economy have created a wealth of new jobs that require workers with appropriate education and training. The center also projects that nearly two thirds of jobs created in the United States by the year 2018 will require some form of postsecondary education (Carnevale, Smith, & Strohl, 2010). To meet these workforce needs, President Obama has set a goal of ensuring that every American has access to at least one year of postsecondary training or higher education to gain the skills needed to rebuild the economy and meet workforce demands.

Increasing the number of Americans with the education, skills, and training needed for the economy is a multilayered strategy. Some of the steps to achieve this goal include making teaching and learning in secondary schools more rigorous, engaging, and relevant; ensuring that more students are college and career ready; increasing high school graduation rates, especially for lower performing students; providing opportunities for youth to learn about and experience careers; and smoothing the transition to postsecondary success (Balfanz, Bridgeland, Bruce, & Hornig Fox, 2013). While addressing these issues will require significant change across the entire education system, increasing opportunities for students to participate in high-quality career and technical education is an existing comprehensive strategy that impacts all of them.

Career and technical education (CTE) is an educational strategy for providing young people with the academic, technical, and employability skills and knowledge to pursue postsecondary training or higher education and enter a career field prepared for ongoing learning (Partnership for 21st Century Skills, Association for Career and Technical Education, & National Association of State Directors of Career Technical Education Consortium, 2010). CTE is

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eliminating vocational education that consisted of low-level courses, job training, and single electives and replacing it with academically rigorous, integrated, and sequenced programs of study that align with and lead to postsecondary education. These programs provide students with opportunities to acquire the competencies required in today's workplace—such as critical thinking, collaboration, problem solving, innovation, teamwork, and communication—and to learn about different careers by experiencing work and workplaces. CTE is no longer just about teaching students a narrow set of skills sufficient for entry-level jobs; it is about preparing students for careers.

High-quality CTE addresses the goals of college and career readiness and provides learning options that are appealing for students who might otherwise be at risk of leaving high school. High-quality CTE programs and pathways ensure that coursework is simultaneously aligned to rigorous academic standards and postsecondary expectations and informed by and built to address the skills needed in specific career pathways. CTE pathways and programs use applied, contextual learning to help students see the relevance of what they are learning and its connection to career opportunities and life goals. These pathways and programs also can provide innovative options for supporting students with different learning styles. The evolution of CTE is making it a more popular and viable option for students of all abilities. According to the National Center for Education Statistics (2011), 90 percent of high school graduates have earned some CTE credits. Furthermore, research on high-quality CTE programs and pathways shows that these programs reduce dropout rates; encourage participation in postsecondary education; and enable students to earn dual enrollment credits, industry-endorsed certificates, and technical endorsements on high school diplomas (Plank, DeLuca, & Estacion, 2005). CTE pathways have the potential to engage many more students and increase high school graduation rates and postsecondary success.

The Federal Role in Career and Technical Education and the Perkins Act

The federal government has a long history of investment in vocational education starting with the passage of the Smith-Hughes Act in 1917, which focused primarily on skills training in the agricultural sector. Federal investment in vocational education began changing in 1984 with the passage of the Carl D. Perkins Vocational Education Act and has been advancing ever since. As the name change suggests, the current iteration of the Carl Perkins Career and Technical Education Act, last reauthorized in 2006, has been a driving force for the transformation of vocational education into CTE as a critical component of a college- and career-readiness education. The Perkins Act provides federal resources to help individuals gain the academic and technical skills needed to be successful in today's workforce. The federal law promotes a greater focus on academic rigor, career-focused programs of study, articulation between secondary and postsecondary



education, and greater accountability. Largely due to the nearly \$1.3 billion annual federal investment through the Perkins Act, CTE has developed far beyond the bounds of its predecessor—vocational education.

Perkins Basic State Grants provide formula funding to states, which is then distributed to local education agencies for high schools and to postsecondary institutions, primarily community colleges. States are given discretion in how to split the funds between secondary and postsecondary education, but a minimum of 85 percent of these grants must be distributed based on a formula to local secondary and postsecondary institutions that target disadvantaged students. States and their school districts and postsecondary institutions have flexibility in the use of Basic State Grants funds for activities such as improving programs, providing professional development, supporting the integration of academics and technical education, articulating secondary and postsecondary programs, implementing programs of study, purchasing equipment, providing students with career guidance, and ensuring access to CTE for youth with disabilities and other special populations (Association for Career and Technical Education, n.d.). The federal contribution to CTE is estimated to be only 5 percent (Dortch, 2012), with state and local dollars supporting teachers' salaries and much of the CTE infrastructure. Nevertheless, the federal funds and the "maintenance of effort" provision in the law, which prevents states from supplanting state funds with federal money, drive program improvement and innovations that keep CTE aligned to the expectations of today's workforce.

The federal Tech Prep program was authorized by the Perkins Act and funded from 1991 to 2010. The program laid important groundwork for linking high school and college by helping more students transition into postsecondary education through career pathways. The intent of Tech Prep was to enable students to complete up to four years of CTE coursework at the high school level plus at least two years of college-level CTE coursework,¹ leading to a high school diploma and an associate's degree or certificate. The program required that school districts and community colleges create consortia to administer the programs and establish articulation policies to ensure that students could apply CTE credits earned in high school when they matriculated to college. Tech Prep programs also sought to integrate academic and technical curricula, provide coursework in a meaningful sequence, and offer opportunities for contextual, hands-on learning. A national evaluation of Tech Prep found that the success of a particular consortium depended on a well-structured, comprehensive program that both linked secondary and postsecondary education and had strong curriculum integration (Hershey, Silverberg, Owens, & Hulse, 1998). The structure of and lessons learned from the Tech Prep program laid the groundwork for the next iteration of the Perkins Act in 2006.

¹ Tech Prep education programs included 4+2, 3+2, or 2+2 planned sequences of study in technical fields. A 4+2 program would begin in Grade 9 and include four years of high school CTE coursework while a 2+2 model would begin in Grade 11 and include two years of high school CTE coursework. Each sequence extended through two years of postsecondary occupational education or an apprenticeship program following secondary instruction.



The 2006 law requires states to develop and implement programs of study that build on the secondary-postsecondary articulation started in Tech Prep. Programs of study provide career and technical content that is aligned with rigorous academic standards. This content is provided as part of thoughtfully sequenced curricula and coursework that prepare students for college and careers and often include opportunities to gain postsecondary credit through dual enrollment courses or other avenues. Programs of study often include internships, work experience, and/or opportunities for other real-world application and are designed to result in an industry-recognized credential or associate's or bachelor's degree (Oakes & Saunders, 2008; Carl Perkins Career and Technical Education Act, 2006). Since 2006, states, school districts, and postsecondary institutions have been implementing programs of study, and emerging research indicates that students' test scores, academic grade point averages, and graduation rates have been higher for students in programs of study than for control groups of students who did not participate in programs of study (Castellano, Sundell, Overman, & Aliaga, 2012).

The Perkins Act is due to be reauthorized in 2013, and the U.S. Department of Education has released *Investing in America's Future: A Blueprint for Transforming Career and Technical Education*. The report presents four core principles for the future of CTE as follows:

- **Alignment.** Effective alignment between high-quality CTE programs and labor market needs to equip students with 21st century skills and prepare them for in-demand occupations in high-growth industry sectors;
- **Collaboration.** Strong collaborations among secondary and postsecondary institutions, employers, and industry partners to improve the quality of CTE programs;
- **Accountability.** Meaningful accountability for improving academic outcomes and building technical and employability skills in CTE programs for all students, based upon common definitions and clear metrics for performance; and
- **Innovation.** Increased emphasis on innovation supported by systemic reform of state policies and practices to support CTE implementation of effective practices at the local level (U.S. Department of Education, 2012).

The reauthorization of the Perkins Act and the pending reauthorizations of the Elementary and Secondary Education Act (ESEA) and Workforce Investment Act all offer opportunities to strengthen the national commitment to high-quality CTE.

What CTE Looks Like in Practice

CTE can be viewed as both a structural and instructional approach that can inform the design of schools, programs, and classes as well as the delivery of curriculum and instruction.

CTE is delivered through various institutions, including comprehensive high schools, shared or part-time technical high schools, regional technology centers, statewide



institutes, and community colleges. At the secondary level, CTE is delivered through whole-school models, such as technical or themed high schools; school-within-a-school models, such as career academies or smaller learning communities housed in a large comprehensive high school; or pullout models that allow students to be educated in part-day formats off-campus from their home high school. Some states and districts have created specialized technical institutes open to students across the region. In addition, CTE courses are frequently offered as dual enrollment opportunities, which allow high school students to take college-level courses that result in both high school and postsecondary credit. Many dual enrollment courses are offered on college campuses. At the postsecondary level, community colleges often partner with high schools to provide CTE programs, but they also provide programs for adults, independent of the K–12 system. Examples of CTE programs include computer technology; physical therapy/sports medicine; television production; early childhood education; photography; food service; banking, finance, and investments; and automotive technology.

Schools are increasingly offering programs of study that provide coherent sequences of academic and technical courses—many of which span high school and postsecondary education, from Grades 9–14. Some programs of study also integrate job shadowing,

internships, or paid work experiences in a related enterprise where students can apply their skills. Programs of study are based on the 16 Career Clusters that have been developed by the National Association of State Directors of Career Technical Education Consortium and endorsed by the U.S. Department of Education. The Career Clusters are used to help organize CTE programs and schools. Schools and districts apply the framework to design curricula and instructional activities within specific career fields and to develop programs of study that bridge secondary and postsecondary education. Each Career Cluster provides an organizing theme for the program; academic classes, such as mathematics and science, are presented in the context of the career. Each Career Cluster (see sidebar) represents a distinct grouping of occupations and industries and provides guidance on the knowledge and skills required in specific career fields.²

CTE programs rely on partnerships with employers to deliver content and provide learning opportunities outside the classroom. Employers provide information about the knowledge, skills, and competencies needed for career progression in the industry clusters; offer real-world examples of industry problems and challenges for students to resolve; donate and provide technical equipment; and often supplement instruction by adding their industry expertise to the

The 16 Career Clusters

- Agriculture, Food & Natural Resources
- Architecture & Construction
- Arts, A/V Technology & Communications
- Business Management & Administration
- Education & Training
- Finance
- Government & Public Administration
- Health Science
- Hospitality & Tourism
- Human Services
- Information Technology
- Law, Public Safety, Corrections & Security
- Manufacturing
- Marketing
- Science, Technology, Engineering & Mathematics
- Transportation, Distribution & Logistics

² The National Career Clusters Framework is available online at the National Association of State Directors of Career Technical Education Consortium: <http://www.careertech.org/career-clusters/glance/at-a-glance.html>



material covered by CTE faculty. Employers also make available work-based learning opportunities for many youth, allowing them to experience the workplace and gain valuable employability skills. Last, hundreds of employers are engaged in volunteer activities with the 11 federally designated Career and Technical Student Organizations (CTSOs), which support students in CTE. These organizations, which are cocurricular professional student organizations at the secondary and postsecondary levels, offer unique programs of career and leadership development, motivation, and recognition, in partnership with business and industry. Such CTSOs as SkillsUSA, Distributive Education Clubs of America (DECA), National FFA Organization, and Health Occupations Students of America (HOSA) give students opportunities to work closely with employers, provide service to communities, and participate in national competitions in various industries with industry judges.³

In addition to informing the design and delivery of education, CTE uses innovative instructional strategies. The Perkins Act has a strong focus on expanding the integration of academic and technical knowledge, so that students are able to learn core content knowledge in the context of a career or job task. Through contextualized learning, students' core content knowledge is enhanced and augmented, and they can immediately apply it to problem solving. An example of curriculum integration would be a high school forensics class that requires biology and chemistry as prerequisites, teaches advanced science topics, uses college-level texts, and requires complex scientific inquiry and experimentation; similarly, a sports medicine course might require biology as a prerequisite, focus substantially on anatomy and physiology, revolve around the understanding of body systems, and use science texts to drive the acquisition of scientific knowledge (Stern & Stearns, 2006).

Project-based learning is a common instructional strategy in CTE courses and programs. Often, the projects are multidisciplinary, integrating multiple core academic areas. Classes that use project-based learning incorporate “rigorous projects [that] are carefully planned, managed, and assessed to help students learn key academic content, practice 21st Century Skills (such as collaboration, communication and critical thinking), and create high-quality, authentic products and presentations” (Buck Institute for Education, 2012). Students often help direct and design project-based learning activities, in cooperation with their teachers, and the hands-on nature of this learning keeps them interested and engaged.

A new initiative that is also influencing curriculum and instruction is the Common Career Technical Core (CCTC), a state-led initiative involving business, industry, K–12 education, and higher education, to establish voluntary standards in each of the 16 Career Clusters program areas. State leaders and stakeholders are collaborating to develop rigorous,

³ CTSOs are recognized by the U.S. Department of Education and are eligible to receive funds under the Perkins Act to provide services to students. For more information, visit <http://www2.ed.gov/about/offices/list/ovae/pi/cte/vso.html>.



high-quality standards that are built on industry expectations for the competencies required for success in each field.⁴ These standards apply to both secondary and postsecondary education. Work also is under way by several CTE stakeholder organizations to ensure that CCTC aligns with the Common Core State Standards (CCSS).

Issues Faced by the CTE Field

CTE has evolved promisingly over the past several years, and research suggests that it can be an effective approach to helping students succeed in high school and beyond. However, CTE must overcome a number of challenges to become a truly impactful and wide-reaching strategy for preparing students for postsecondary success. These challenges, which are briefly described below, include the CTE image, the CTE educator workforce, the role of employers in CTE, career guidance and counseling, and horizontal and vertical alignment between CTE and other essential components of the K–12 education system.

THE CTE IMAGE

CTE continues to face challenges with regard to its image as a low-level vocational education track that often leads to a low-skill job with no intermediate postsecondary education. Historically, many low-performing students were tracked into low-level vocational education courses that did not prepare them for access to or success in postsecondary education. Though most current CTE programs are designed to hold all students to more rigorous standards in preparation for postsecondary education and beyond, the perception of vocational education still overshadows CTE's advances. This persistent negative image continues to impact students' and parents' decisions about high school course taking and career pathways.

Fortunately, the changes made to CTE over the past decade to strengthen the rigor of the curriculum and create pathways to postsecondary education are changing attitudes. Though the change is slow, an increasing number of students, parents, and policymakers are beginning to appreciate the education and skills that CTE provides. Research and data on outcomes of CTE students have been key in convincing policymakers of the value of CTE. As outmoded ideas of technical and manufacturing jobs are slowly being replaced with an understanding of the value of today's highly skilled technical careers, CTE is becoming an educational pathway of choice.

⁴ The initiative is being coordinated by the National Association of State Directors of Career Technical Education Consortium: <http://www.careertech.org/career-technical-education/cctc/info.html>



THE CTE EDUCATOR WORKFORCE

Well-qualified educators are essential to providing high-quality and effective CTE programs; however, there are several barriers to ensuring these well-qualified teachers are in the classroom. First, CTE teachers must meet more stringent certification requirements than core academic teachers. In most states, CTE teachers must have a CTE credential that signifies they are well qualified and possess appropriate occupational and educational experience. In addition, they must have a state license to teach at the secondary or postsecondary level. As CTE courses increasingly integrate core academic subjects (e.g., mathematics, science, social studies, English language arts), CTE instructors are also beholden to the “highly qualified teacher” requirements of the 2002 reauthorization of the ESEA,⁵ although some flexibility exists to help CTE teachers comply with the law.⁶ Because high school CTE instructors must be certified (with the appropriate education foundation and content courses), it is often challenging to attract industry experts to these positions.

Once aspiring teachers have committed to pursuing certification in CTE, they often find training to be insufficient. Colleges of education rarely have a CTE training track, resulting in shortages of teaching candidates who have received training in the skills needed to teach CTE courses. Similarly, once CTE teachers are in the classroom, they must keep pace with changes in the career field in which they teach. If teachers are in the classroom for an extended period of time and away from their industry, they may be unaware of trends, changes, and emerging careers in their field.

Fortunately, local community colleges and employers can be leveraged to help bolster teacher instruction and provide an invaluable link to industry practitioners. Because community colleges have great flexibility to hire adjunct faculty, they are better able to employ industry experts as part of their staff. By collaborating with community colleges to develop dual enrollment courses, high schools can provide instructional settings that afford students opportunities to work directly with these experts.

⁵ *Highly qualified*, as defined by ESEA of 2002 (No Child Left Behind Act), includes a list of minimum requirements related to content knowledge and teaching skills that a highly qualified teacher must meet. However, states are given the opportunity to develop a definition of *highly qualified* that is consistent with the federal law as well as with the unique needs of the state. “In general, under the No Child Left Behind Act, a highly qualified teacher must have: a bachelor’s degree; full state certification, as defined by the state; and demonstrated competency, as defined by the state, in each core academic subject he or she teaches” (U.S. Department of Education, 2004a, p. 10).

⁶ For example, by a demonstration of competency known as High, Objective, Uniform State Standard of Evaluation (HOUSSE): “NCLB allows states to develop an additional way for current teachers to demonstrate subject-matter competency and meet highly qualified teacher requirements. Proof may consist of a combination of teaching experience, professional development, and knowledge in the subject garnered over time in the profession” (U.S. Department of Education, 2004b, p. 2).



THE ROLE OF EMPLOYERS IN CTE

CTE courses often combine classroom-based instruction with work-based learning, internships, or apprenticeships. These approaches provide students with the opportunity to work with local employers, learning directly from those who have already established their careers. Exposure to the workplace allows students to learn employability skills, see how academic content is applied in real-world settings, and collaborate with adults on authentic work projects. Employers' firsthand experience also can be engaged through a number of additional support roles.

Employers can serve as advisors to CTE teachers to ensure that curriculum and instruction are relevant, current, and reflect changing technologies and knowledge. They can provide information about careers and the skill sets needed to hold certain jobs; mentor students about career opportunities and pathways; serve as judges of student work for industry competitions; donate equipment; serve as adjunct faculty or volunteer teachers; and offer teachers externships during the summer so that they can learn about new careers, processes, and technologies.

Finding community colleges and/or employers that are willing to develop partnerships or offer work-based placements can be a challenge. One strategy to address this challenge is for high schools to hire a dedicated staff person to build relationships with employers and develop work-based learning opportunities for students. Consortia of schools, colleges, and employers can also be an effective strategy, and the CTSOs, which have strong industry partners, can be the basis for building relationships between secondary and postsecondary schools and employers to identify opportunities for career experiences.

CAREER GUIDANCE AND COUNSELING

Students need advising and counseling to make well-informed decisions about their career plans. Many students receive advice from family members and other adult contacts; but some students, especially those with limited access to college- and career-planning resources, may rely more on school counselors for information. Unfortunately, many schools have been forced to cut school counselor positions due to budgetary constraints, resulting in a national average student-to-counselor ratio of 459:1 in the 2009–10 school year (National Center for Education Statistics, Common Core of Data, 2010). As a result, career guidance and counseling is severely limited, and most counselors have time to focus only on test scheduling or the college application process. Because of this focus, many counselors know little about current and emerging careers or the knowledge and skill requirements of most jobs.

Although schools would benefit from having more career guidance counselors, in today's economic climate, it is unlikely that the reduction in school funds will allow for a drastic increase in counselor positions. In place of more counselors, schools and colleges can



encourage teachers and faculty to advise students on a more regular basis, invite employers to meet with students to talk about careers and skills needed, build career exploration into certain classes, and/or create career advisories. Advisories often are elective classes during which a small group of students meets with a school staff member to discuss academic and career goals and to map out course pathways and supports that will enable each student to meet those goals by high school graduation. Advisories also may offer students an opportunity to learn about various careers. As an alternative strategy, some high schools that offer numerous CTE programs of study provide a semester-long exploration of each pathway as a way to help students decide which program of study to pursue.

CTE AND GENERAL EDUCATION ALIGNMENT AND COLLABORATION

Though well-implemented programs of study require strong cooperative partnerships between core content and CTE teachers, there is still substantial work to be done to ensure that fruitful CTE and general education collaborations exist at every level. Policymakers must communicate and collaborate to align and integrate core content and CTE standards. In the classroom, educators must pool resources to present an integrated curriculum in both CTE and core classes. And accountability systems must be retooled to ensure that aligned metrics assess a range of student knowledge and abilities that predict readiness for success in both college *and* careers.

ESEA flexibility requirements and the increased focus on rigorous college- and career-ready standards and assessments ensure that the political climate is ripe for these collaborations. However, a recent report by Achieve Inc. notes that many states are not taking advantage of this opportunity to break down silos between CTE and general education leaders (Achieve Inc., 2012). Almost half of the states that responded to the Achieve survey noted that they had not included a CTE representative as part of their CCSS implementation teams, showing a lack of understanding about the degree to which literacy and mathematics standards can be integrated into CTE courses.

Though many states have not yet recognized the potential of this opportunity, some are working to bridge the two systems. For example, Oregon has included the state's director of CTE along with high school and postsecondary CTE educators on the CCSS Stewardship Team. Ohio has engaged core content and CTE teachers in a three-year process to revise the 16 Career Clusters, ensuring that the new state standards will be aligned with the CCSS. As many states adopt both the CCSS and standards within the CCTC, additional opportunities likely will emerge for collaboration between general education and CTE. Although it is still too soon to fully understand the impact of these new standards, the development and implementation of both systems provide an opportune moment to align the two sets of standards and ensure that the CTE and general education communities are openly sharing their work with each other.



Aligned standards will likely lead to increased collaboration between CTE and general educators at the school level; however, additional efforts are needed to ensure that students receive aligned and integrated instruction. These teachers must be afforded opportunities to work in teams to develop curricula that integrate content in the context of careers. Research suggests that embedding learning in the context of a career or theme helps students understand how to apply their knowledge. A 2008 study conducted by the National Research Center for Career and Technical Education (NRCCTE) examined the Math-in-CTE model, a curriculum integration model that enables mathematics and CTE teacher teams to collaborate in communities of practice to identify where mathematics intersects with CTE concepts and applications. The study found that teaching mathematics in context can have a significant positive impact on student learning, further indicating that teachers in traditional academic areas can become more effective by understanding how to teach in context and how knowledge is applied and used (Stone, Alfeld, & Pearson, 2008).

Although applied learning can be an effective strategy for both teachers and students, it is essential that teachers receive appropriate professional development to support this work. Preservice and professional development should help general education and CTE instructors learn how to embed academics into the technical curriculum, integrate academic and technical content, reinforce and augment core content learning in CTE classes, and help students apply their knowledge.

Increased alignment of standards and integration of curricula also must be paired with appropriate assessments to measure student knowledge of and skills in both CTE and general education content. States are exploring new forms of assessment aligned to the CCSS by working with two consortia: the Partnership for Assessment of Readiness for College and Careers and the Smarter Balanced Assessment Consortium. According to the consortia, the new assessments will measure applied knowledge and skills, not just rote memorization. The assessments will be designed to test critical thinking and problem-solving skills that many CTE students learn through project-based learning.

To ensure that data are collected on a wide range of college- and career-readiness skills, states should consider multiple forms of assessment—such as performance-based assessments—that allow CTE students to showcase the knowledge and abilities they have gained through CTE courses, in addition to academic skills. As states design new accountability systems to meet the requirements of the ESEA flexibility plans, they have the opportunity to encourage schools and districts to invest in multiple measures through their designs. The Perkins Act requires that CTE students be subject to the same mathematics and English language arts assessment requirements as all other high school students, but most state accountability systems do not currently incorporate knowledge and skills unique to CTE classes. By including CTE-specific measures in new accountability systems, states will signal that these measures are as highly valued as traditional academic skills, encouraging the development of multiple measures and an ongoing investment in CTE.



K–12 AND POSTSECONDARY ALIGNMENT AND PARTNERSHIPS

In addition to alignment within the K–12 system, it is essential that high school CTE programs align and develop partnerships with stakeholders in postsecondary CTE. Ostensibly, all CTE programs are designed with an eye toward postsecondary success, but often students encounter challenges making the transition from high school CTE to postsecondary programs or workforce training. Students must receive strong foundational knowledge and skills in their high school coursework that are aligned with the expectations they will face in college. Once enrolled in college, students will require strategies and tools to help them seek support and engage with postsecondary faculty. Finally, it is important to ensure that college-level work that students undertake in high school as part of CTE or other dual enrollment programs receives appropriate credit at the institutions of higher education at which they choose to enroll. In the past, some Tech Prep students were not able to count college credits when they matriculated to college or they could count the credit only if they enrolled at the partner community college, thereby limiting their options.

Fortunately, CTE has a long history of fostering strong partnerships between high schools and postsecondary education, particularly with community colleges. CTE programs can be structured to ensure that curriculum and instruction are aligned with postsecondary-level work to provide students with clear pathways to postsecondary education and training. Collaboration between secondary and postsecondary institutions began with Tech Prep and was strengthened through the Perkins Act mandate to create programs of study that span Grades 9–14. Although there is a growing interest in building programs of study, maintaining partnerships takes time and resources and can be quite challenging. Leaders in K–12 and higher education need to set priorities to create and maintain these partnerships in an effort to help more students be college ready and successful.

Postsecondary partnerships are essential to ensure that high school curricula are aligned with postsecondary entrance standards and that instruction prepares students to meet postsecondary levels of rigor. Teachers and faculty can work together to identify the level of skills and knowledge needed to do college-level work and to help their students attain this level. To better prepare students to interact with college faculty and solicit support, dual enrollment opportunities can be developed. Dual enrollment programs enable high school students to take college courses, either at the high school or on a college campus. These programs benefit students by helping them learn about college, see themselves as college students, and experience college-level work in a supportive environment, all while engaging in higher level work or courses that are not available at their high school. Finally, to ensure that students receive credit for the advanced coursework they complete, K–12 and postsecondary partnerships must be leveraged to facilitate the process. Transparent and consistent articulation agreements are needed to ensure that students get credit for the college courses taken during high school. That approach, when combined with rigorous high school instruction and dual enrollment opportunities, will help smooth students' transition to postsecondary success.



Conclusion

Though CTE still faces many challenges, it also is an integral strategy for preparing students for postsecondary success. As CTE continues to evolve into an academically rigorous pathway that offers students an opportunity to learn in context, it has become a viable approach to ensure that students are ready for both careers and college. In an economy that requires well-trained and highly skilled professionals, it is a proven method for endowing young people with the knowledge and skills necessary to be successful members of the workforce. If educators and policymakers are to make good on the national commitment to graduate more students from high school prepared to face postsecondary challenges, schools must continue to improve CTE, ensuring that students have access to high-quality pathways to success.

States can help schools and districts implement successful CTE programs by:

- Sharing research and data on the value of CTE as a college- and career-readiness pathway.
- Providing alternative certification options for well-qualified industry experts to become CTE instructors.
- Providing high-quality professional development to aspiring and current CTE teachers.
- Aligning rigorous content standards with high-quality Career Clusters standards.
- Soliciting feedback from workforce stakeholders on statewide college- and career-readiness expectations.
- Encouraging districts to provide flexibility for collaborative learning communities of CTE and general education teachers.
- Fostering relationships between schools and districts and institutions of higher education.

For more information on CTE, please see the additional resources provided below.

Resources

There are many organizations committed to advancing a new vision of CTE that enhances opportunities for students to acquire academic knowledge and workforce-relevant competencies in rigorous career pathways courses. The following organizations represent a few of those providing information and tools to help schools, districts, and states build and strengthen their CTE pathways.

Association for Career and Technical Education (ACTE): ACTE is a national education association dedicated to preparing youth and adults for careers through CTE programs at the secondary, postsecondary, and adult levels. The ACTE website includes a CTE Research Clearinghouse, state-by-state profiles of CTE, advocacy and policy guidance,



as well as guidance for practice. Resources are available to help CTE educators pursue continuing education, improve instruction, and develop new programs, including through the site's Lesson Plan Library: www.acteonline.org

Career and Technical Student Organizations (CTSOs): CTOSs are student organizations that prepare emerging leaders and entrepreneurs for careers in various fields. CTOSs provide unique activities that foster career-related skills and leadership development. They arrange educational and leadership activities and materials through 11 organizations across the United States. This site provides an overview of the organizations and links to each: <http://www2.ed.gov/about/offices/list/ovae/pi/cte/vso.html>

College & Career Academy Support Network (CCASN): CCASN is dedicated to the goal of improving high schools, particularly through career academies and other small learning communities. Career academies combine coursework that prepares students for both college and career. Partnerships with employers and higher education institutions give students opportunities to learn beyond the high school classroom. The site offers academy directories, useful resources such as toolboxes and articles, a searchable database of curriculum materials, and professional support services: <http://casn.berkeley.edu/>

ConnectEd: The California Center for College and Career: The mission of ConnectEd is to prepare students for college and careers through a high school improvement approach known as Linked Learning, focused on connecting academics with real-world experience in diverse fields, including engineering, arts and media, and biomedical and health sciences. The ConnectEd website has research and policy resources, as well as information on implementing integrated curriculum units and multidisciplinary lessons designed to make meaningful connections for students across subject areas: <http://www.connectedcalifornia.org/>

National Academy Foundation (NAF): NAF promotes a school reform strategy that moves large, comprehensive high schools to smaller learning communities and enriches the curriculum through a focus on career themes tied to college. Its educational model includes industry-focused curricula, work-based learning experiences, and business partner expertise. Its website offers numerous resources on the NAF curriculum, professional development, standards, and assessment: <http://naf.org/>

National Association of State Directors of Career Technical Education Consortium (NASDCTEc): This consortium represents the state leaders of secondary, postsecondary, and adult CTE across the nation. NASDCTEc provides leadership and support for the National Career Clusters Framework, focused on curriculum design and instruction. The website includes state CTE profiles with each state's enrollment data, information on funding, and accountability indicators for secondary, postsecondary, and adult CTE. Issue briefs on the website lay out the core principles of a new vision for CTE articulated by CTE leaders, advocates, and partners: <http://www.careertech.org/>



National Career Academy Coalition (NCAC): NCAC is the recognized leader for collaborative support and sustainability of career academies, whose mission is to create and support a national network of existing and emerging career academies. It works to define and implement an evaluation process based on the national standards of practice that will assist career academies in their development and sustainability; provide technical assistance, training, and other support to emerging and existing academies, schools, and community partners; and develop networks of support for related career-specific programs and regional academy personnel and partners. The site provides information on the history and current status of career academies, a directory of academies, information on Career Clusters, and a link to the National Standards of Practice for Career Academies: <http://www.ncacinc.com/>

National Research Center for Career and Technical Education (NRCCTE): NRCCTE is the primary agent for generating scientifically based knowledge, dissemination, professional development, and technical assistance to improve CTE in the United States. It works to improve the integration of CTE with academic instruction; the integration of secondary and postsecondary CTE; the use of educational technology and distance learning; the transition of CTE participants to high-skill, high-wage, or high-demand occupations; and the use of state-adjusted levels of performance to improve CTE programs and student achievement. Its website includes resources and rigorous research on core issues in CTE: <http://www.nrccte.org/>

References

- Achieve Inc. (2012). *Common Core State Standards & 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>
- Association for Career and Technical Education. (n.d.). *Carl D. Perkins Act implementation*. Retrieved from <https://www.acteonline.org/general.aspx?id=687#plans>
- Balfanz, R., Bridgeland, J. M., Bruce, M., & Hornig Fox, J. (2013). *Building a grad nation: Progress and challenge in ending the high school dropout epidemic*. Retrieved from <http://www.americaspromise.org/Our-Work/Grad-Nation/Building-a-Grad-Nation.aspx>
- Buck Institute for Education. *Project based learning for the 21st century: What is PBL?* Retrieved from http://www.bie.org/about/what_is_pbl/
- Carl Perkins Career and Technical Education Act of 2006, Pub. L. No. 109-270, Section 122(c)(1)(A) (2006). Retrieved from <http://www.gpo.gov/fdsys/pkg/BILLS-109s250enr/pdf/BILLS-109s250enr.pdf>
- Carnevale, A., Smith, N., & Strohl, J. (2010). *Help wanted: Projections of jobs and education requirements through 2018*. Washington, DC: Georgetown University, Center for Education and the Workforce. Retrieved from <http://www9.georgetown.edu/grad/gppi/hpi/cew/pdfs/FullReport.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, 98–118.



- Dortch, C. (2012). *Carl D. Perkins Career and Technical Education Act of 2006: Implementation issues*. Washington, DC: Congressional Research Service.
- Hershey, A. M., Silverberg, M. K., Owens, T., & Hulsey, L. K. (1998). *Focus for the future: The final report of the National Tech-Prep Evaluation*. Princeton, NJ: Mathematica Policy Research Inc. Retrieved from <http://www.mathematica-mpr.com/publications/pdfs/Tech.pdf>
- National Center for Education Statistics. (2011). *Postsecondary and labor force transitions among public high school career and technical education participants*. Retrieved from <http://nces.ed.gov/pubs2011/2011234.pdf>
- National Center for Education Statistics, Common Core of Data (CCD). (2010). *Documentation to the Common Core of Data state nonfiscal survey of public elementary/secondary education: School year 2008-2009*. Retrieved from <http://nces.ed.gov/ccd/pdf/StNonfis081cgen.pdf>
- Oakes, J., & Saunders, M. (2008). *Beyond tracking: Multiple pathways to college, career and civic participation*. Boston: Harvard Education Press.
- Partnership for 21st Century Skills, Association for Career and Technical Education, & National Association of State Directors of Career Technical Education Consortium. (2010). *Up to the challenge: The role of career and technical education and 21st century skills in college and career readiness*. Retrieved from http://www.p21.org/storage/documents/CTE_Oct2010.pdf
- Plank, S., DeLuca, S., & Estacion, A. (2005). *Dropping out of high school and the place of career and technical education: A survival analysis of surviving high school*. St. Paul, MN: National Research Center for Career and Technical Education.
- Stern, D., & Stearns, R. (2006). *Combining academic and career-technical courses to make college an option for more students: Evidence and challenges*. Berkeley, CA: Graduate School of Education.
- Stone, J. R. III, Alfeld, C., & Pearson, D. (2008). Rigor and relevance: Testing a model of enhanced math learning in career and technical education. *American Educational Research Journal*, 45(3), 767-795.
- U.S. Department of Education. (2004a). *No Child Left Behind: A toolkit for teachers*. Retrieved from <http://www2.ed.gov/teachers/nclbguide/nclb-teachers-toolkit.pdf>
- U.S. Department of Education. (2004b). *New No Child Left Behind flexibility: Highly qualified teachers* (Fact Sheet). Retrieved from <http://www2.ed.gov/nclb/methods/teachers/hqtflexibility.pdf>
- U.S. Department of Education, Office of Vocational and Adult Education. (2012). *Investing in America's future: A blueprint for transforming career and technical education*. Retrieved from <http://www2.ed.gov/about/offices/list/ovae/pi/cte/transforming-career-technical-education.pdf>



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