

# Career-Technical Education and College<sup>1</sup> Readiness: Evolution of High School Pathways in the United States

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Education for work at the high school level in the U.S. has changed dramatically since the mid 1980s. What used to be known as vocational education (VE) was rebranded as career and technical education (or career-technical education, CTE). Preparing students for immediate entry into full-time employment after high school is no longer a widely espoused goal, and most students who take work-related courses in high school now also complete sufficient academic coursework to enter some form of postsecondary education. In effect, the non-college track is gradually disappearing from American high schools. Preparing high school students for both careers and college has been widely expressed as a goal of public policy, and successful examples in many states and localities have demonstrated that achieving this dual goal is indeed possible.

However, the transition from 20<sup>th</sup> century VE to 21<sup>st</sup> century CTE is far from complete. Many high schools are still grooming some students for college and other students for work. The independent advisory panel for the 2014 National Assessment of Career and Technical Education (NACTE) observed that, “exemplary CTE programs are seen as exceptions to mainstream options. CTE is still perceived by many as an alternative to rigorous academics—a separate track for students who are not college bound.”<sup>2</sup>

The 1917 Smith-Hughes Act first authorized federal funding for VE in high schools, despite objections at the time by John Dewey and others that creating a separate vocational curriculum would artificially separate theory from practice, and would lead to segregating students along socioeconomic lines.<sup>3</sup> The recent rebranding of VE as CTE was intended to overcome the problems Dewey and others correctly foresaw.

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<sup>1</sup> Following customary usage in the U.S., the word “college” here refers to postsecondary education in general, including programs that lead to associate’s, bachelor’s, or more advanced degrees.

<sup>2</sup> Independent Advisory Panel of the National Assessment of Career and Technical Education (2014), *Putting “career” in “college and career ready”*: The report of the Independent Advisory Panel of the National Assessment of Career and Technical Education, Washington, DC. page 3.

<sup>3</sup> See Herbert M. Kliebard (1999). *Schooled to work: Vocationalism and the American curriculum, 1876–1946*. New York, NY: Teachers College Press. Also Marvin Lazerson and W. Norton Grubb (1974), *American education and vocationalism, a documentary history*. New York: Teachers College Press.

This paper will:

- briefly describe the evolution of vocational education to career-technical education;
- explain how this shift helps resolve a fundamental dilemma for U.S. high schools;
- summarize evidence that students benefit more from pathways that combine CTE with college preparation than from CTE alone; and
- list some principles to guide development of pathways that combine preparation for college and careers.

### **Evolution of high school vocational education to career-technical education.<sup>4</sup>**

During most of the 20<sup>th</sup> century, high schools were designed to prepare some students for college and other students for work. That has changed. Now the most commonly stated goal of high school is to prepare students for *both* college *and* careers — for example, this is the tag line on the logo for the Common Core State Standards, and is widely espoused as a goal even in states that are not using Common Core.

In the 1980s, what was then called vocational education (VE) started evolving toward what is now called career and technical (or career-technical) education (CTE). VE courses were explicitly intended to prepare high school students for direct entry into full-time work — *not* for college or university. In contrast, CTE courses are meant to fit together with classes in academic subjects so that high school students are prepared *both* for work *and* for post-secondary education leading to certificates, associate’s degrees, bachelor’s and advanced degrees.

The change from VE to CTE is evident in federal legislation. As recently as 1998, the federal law authorizing funds for VE continued to define it as preparation for careers “other than careers requiring a baccalaureate, master’s, or doctoral degree.” But the 2006 reauthorization, which replaced the term “vocational” with “career and technical,” finally eliminated the prohibition against using the federal funds to prepare students for careers that require a bachelor’s or advanced degree. And in 2014 the federal agency that oversees this funding changed its name from the Office of Vocational and Adult Education to the Office of Career, Technical, and Adult Education.

Starting in the 1980s, patterns of course taking by high school students shifted away from VE as a separate, non-college track. Among high school graduates who completed an occupational course sequence, the number who also completed the core academic coursework expected for college jumped from 28 percent in 1982 to 88 percent in 2000.<sup>5</sup> Thus almost all

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<sup>4</sup> Parts of this section also appeared in Mary G. Visher and David Stern (2015), *New pathways to careers and college: Examples, evidence, and prospects*. New York: MDRC.

<sup>5</sup> National Center for Education Statistics, *National Assessment of Educational Progress, High School Transcript Study 2000*, Table 2; published online only, at <http://nces.ed.gov/nationsreportcard/hsts/tables/hsts002.asp> (retrieved July 2, 2008). Students are

students who take an occupational course sequence are now also completing an academic core curriculum in English, math, and science.

The change from VE to CTE was prompted in part by new demands from employers. Traditionally the main advocates of federal funding for VE, employers in the 1980s began to express concern that entry-level job training in high school was not sufficient to prepare employees for increasingly rapid change in technology, products, and the organization of work.<sup>6</sup> Employer organizations continue to support CTE as a complement to, not a substitute for, college preparation — aimed at making students “college ready PLUS.”<sup>7</sup>

Traditional VE, as a track for students who were not deemed college-bound, also had been consistently criticized for enrolling disproportionate numbers of low-income and minority students, and limiting their options.<sup>8</sup>

Several high school reform efforts promoted the movement from VE to CTE. One of the most important was *High Schools That Work*, launched in 1987 by the Southern Regional Education Board. Career academies, which began in Philadelphia in 1969 and were replicated during the 1980s in California and New York City, also embody the CTE approach by fitting an occupational course sequence together with the academic coursework expected for college.

The evolution from VE to CTE is still not complete. Century-old patterns take time to change. The National Association of State Directors of Career Technical Education Consortium (NASDCTEc, now renamed Advance CTE) articulated a vision for CTE organized in 16 career clusters divided into 79 pathways, and in 2012 published Common Career Technical Core (CCTC) standards that include end-of-program outcomes for each pathway and cluster, along with 12 cross-cutting “career-ready practices” that apply to all pathways.<sup>9</sup> The CCTC standards were intended to support the goal of transitioning to a CTE delivery system built around programs of

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defined as vocational concentrators if they earned at least 3 credits in a single specific labor market preparation field but had less than 12 credits in the core academic course areas of English, social studies, mathematics, and/or science.

<sup>6</sup> See, for example, National Academy of Sciences, Panel on Secondary School Education and the Changing Workplace (1984), *High Schools and the Changing Workplace, the Employers' View* (Washington, D.C.: National Academy Press). Also David T. Kearns and Denis P. Doyle (1988), *Winning the Brain Race: A Bold Plan to Make our Schools Competitive* (San Francisco, CA: Institute for Contemporary Studies, ICS Press). Kearns was the CEO of Xerox Corporation from 1982 to 1990 and became Deputy Secretary of Education from 1991 to 1993 under President George H.W. Bush.

<sup>7</sup> U.S. Chamber of Commerce Foundation (2015), *Career Readiness: A Business-Led Approach for Supporting K-12 Schools*. Washington, D.C.: U.S. Chamber of Commerce Foundation.

<sup>8</sup> For example, see Jeannie Oakes (1985), *Keeping Track: How Schools Structure Inequality* (New Haven: Yale University Press).

<sup>9</sup> National Association of State Directors of Career Technical Education Consortium (2012), *Common Career Technical Core*. Silver Spring, MD: NASDCTEc. Examples of the career-ready practices are: “Communicate clearly, effectively and with reason”; “Utilize critical thinking to make sense of problems and persevere in solving them”; and “Model integrity, ethical leadership and effective management.”

study that link secondary and postsecondary education. However, a 2013 study commissioned by NASDCTEc<sup>10</sup> to determine whether states were adopting the CCTC standards found that “state CTE standards are only partially aligned to the CCTC benchmark standards” (p. 21). Reflecting the legacy of traditional VE, state standards for high school CTE tend to be course-specific and geared to preparation for specific jobs. The study concludes that many states “will have to decide if they want to incorporate a set of broader CCTC Career Cluster and Career Pathway standards, alongside or in place of existing state or industry standards that are narrower in focus.” (p. 28)

### **How combining CTE with college preparation solves a core dilemma for U.S. high schools<sup>11</sup>**

High schools face a fundamental dilemma. A large majority of high school students want to attain a bachelor’s or advanced degree.<sup>12</sup> Even among high school CTE concentrators, 54 percent in 2004 expected to earn a bachelor’s or advanced degree — up sharply from 22 percent in 1982.<sup>13</sup> High school students and their parents often know that such degrees provide better access to managerial and professional jobs with higher salaries, along with more comfortable working conditions, greater employment security, and other benefits.<sup>14</sup> Although some people with less schooling earn more than some other people with more schooling, the positive relationship between years of schooling and average earnings is one of the most universal and robust patterns in all of social science.

Contrary to the view that a bachelor’s degree means liberal arts, most bachelor’s degrees awarded in the U.S. are actually in fields of study that are explicitly occupational. In 2012-13, business, education, and health professions together accounted for 35 percent of all bachelor’s degrees. Adding other occupational majors such as engineering, law enforcement, and agriculture brings the total to 52 percent.<sup>15</sup> Most baccalaureate students are pursuing practical purposes.

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<sup>10</sup> National Association of State Directors of Career Technical Education Consortium (2013), *The State of Career Technical Education: An Analysis of State CTE Standards*. Silver Spring, MD: NASDCTEc.

<sup>11</sup> Parts of this section also appeared in Mary G. Visher and David Stern (2015), *New pathways to careers and college: Examples, evidence, and prospects*. New York: MDRC.

<sup>12</sup> Educational expectations of high school students were reported in US Department of Education, National Center for Education Statistics (2011), *The High School Longitudinal Study of 2009*, NCES 2011-327. Degree completion rates by age group are reported in the annual *Digest of Education Statistics*.

<sup>13</sup> Ben Dalton, Erich Lauff, Robin Henke, Martha Alt, and Xiaojie Li (2013), *From Track to Field: Trends in Career and Technical Education Across Three Decades* (background paper prepared for 2014 National Assessment of Career and Technical Education), Table 19.

<sup>14</sup> Anthony P. Carnevale, Stephen J. Rose and Ban Cheah (no date), *The college payoff: Education, occupations, lifetime earnings*. Washington, D.C.: Center on Education and the Workforce, Georgetown University. Also, Pew Research Center (2014), *The Rising Cost of Not Going to College* (<http://www.pewsocialtrends.org/2014/02/11/the-rising-cost-of-not-going-to-college/>)

<sup>15</sup> U.S. Department of Education (2014), *Digest of Education Statistics*, table 322.10. An additional 5 percent are in visual and performing arts, which could be considered occupational. The largest non-occupational majors are psychology, social sciences and history, which together account for 16 percent.

The fact that only about one out of three Americans completes a bachelor's degree by age 30 creates a dilemma, however, because that number is so much smaller than the number of high school students who say they want a bachelor's or advanced degree. If high schools try to respect students' aspirations by preparing all students *only* for four-year colleges and universities, many young people will finish their schooling without any technical knowledge or skill to earn a living.<sup>16</sup> But if high schools limit access to the courses required for admission to four-year colleges only to students who at age 14 are deemed likely to succeed there, the high schools will mistakenly short-change many talented young people, including disproportionate numbers from low-income families, racial or linguistic minorities, or recent immigrants — an injustice to those students and a loss to the nation.

Combining CTE with college preparation resolves this dilemma by equipping high school students for *both* employment *and* a full range of postsecondary educational options. Coursework required for four-year college admission can be made available to all students willing to put in the effort. Access to college courses while students are still attending high school is also possible. At the same time, these same high school students can complete a rigorous sequence of CTE coursework, which will help them earn a living whether or not they finish a college degree. Obtaining industry-recognized credentials while in high school also helps young people earn higher wages whether they enter full-time employment or work part-time while in college. And if students later decide to enter fields different from the high school pathway they started in high school, it does not mean they have wasted their time, because the more coherent, integrated curriculum and other features of pathways have increased their motivation to learn something in high school, and given them insights to discover their own path to productive adulthood.

### **Evidence from pathways that combine CTE with college preparation**

High school pathways that combine CTE with college-prep curriculum have been found effective in preparing students both for employment and for postsecondary education including baccalaureate programs. Evaluations of career academies provide the clearest evidence of benefits from combining an occupational course sequence with college-prep academic coursework, along with work-based learning and the support of a smaller learning community.<sup>17</sup> Several studies in the 1980s and 1990s found that career academy students had greater success in high school and beyond, compared to similar students from the same high schools. Career academy students generally showed relatively improved attendance, credits,

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Other non-occupational majors include mathematics and statistics, foreign languages, and liberal arts and sciences.

<sup>16</sup> A well-researched challenge to the idea of preparing all students for four-year college was James E. Rosenbaum (2001), *Beyond College for All: Career Paths for the Forgotten Half* (New York: Russell Sage).

<sup>17</sup> This evidence is summarized in David Stern, Charles Dayton, and Marilyn Raby (2010), *Career Academies: A Proven Strategy to Prepare High School Students for College and Careers*. Berkeley, CA: Career Academy Support Network, University of California.

[http://casn.berkeley.edu/resource\\_files/Proven\\_Strategy\\_2-25-1010-03-12-04-27-01.pdf](http://casn.berkeley.edu/resource_files/Proven_Strategy_2-25-1010-03-12-04-27-01.pdf)

and grades. One study found that career academy students from a large district who entered a local university were more likely to complete their bachelor's degrees than other students from that same district.<sup>18</sup>

But since students must apply to be part of a career academy, it is possible that academy students were more highly motivated or better organized to begin with, so their greater success might not all be attributable to the academy experience. The best research strategy to avoid this ambiguity is random assignment of students either to an academy or to a control group that remains enrolled in the regular high school program. This kind of experimental study was conducted by MDRC.

MDRC's study corroborated many of the earlier results. Notably, among students most at risk of dropping out, 79 percent of academy students stayed in school through spring of senior year, compared to 68 percent of the control group. Eight years after high school, students assigned to academies had average monthly earnings of \$2,112, compared to \$1,896 for the control group.<sup>19</sup> At the same time, MDRC found no significant differences in postsecondary educational attainment between the two groups, so the gain in earnings did not come at the cost of further education.<sup>20</sup>

A more recent study conducted by the College & Career Academy Support Network (CCASN) at the University of California, Berkeley, compared outcomes for students enrolled in California's state-funded career academies (called California Partnership Academies or CPAs) with statewide outcomes for all public high schools.<sup>21</sup> This study found that 95 percent of academy seniors in 2009-10 graduated at the end of the school year, compared with 85 percent of all California public high school seniors. Notably, among academy graduates, 57 percent reportedly completed the full set of courses required for admission to California State University or the University of California, compared to only 36 percent of graduates statewide. This last result demonstrates that career-themed pathways can in fact give students the option of attending college. Moreover, the law governing CPAs requires that at least half the students entering an academy in grade 10 must meet specified "at risk" criteria including low income, low grades and test scores, and a record of poor attendance — and a subsequent CCASN study confirmed that academy 10<sup>th</sup> and 11<sup>th</sup> graders generally do come from families with lower

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<sup>18</sup> Nan L. Maxwell (2001), "Step to College: Moving from the high school career academy through the four-year university." *Evaluation Review* 25(6):619-654, December.

<sup>19</sup> James J. Kemple (2008), *Career Academies: Long-Term Impacts on Labor Market Outcomes, Educational Attainment, and Transitions to Adulthood* (New York: MDRC). Amounts are in 2006 dollars.

<sup>20</sup> Eight years after scheduled high school completion, 50 percent of both the academy and control groups had completed a postsecondary degree or certificate, compared to 28 percent of graduates from urban, public, non-selective high schools in the NELS sample (Kemple 2008, Exhibit 5). The numbers who had received bachelor's or higher degrees were 16 percent of the academy students, 18 percent of the control group, and 12 percent of the NELS urban sample.

<sup>21</sup> Charles Dayton, Candace H. Hester, and David Stern (2011), *Profile of California Partnership Academies 2009-10* (College & Career Academy Support Network, University of California, Berkeley). <http://casn.berkeley.edu/resources.php?r=293&c=1>

income and lower parental education, compared with non-academy students in the same high schools.<sup>22</sup> However, the positive outcomes for CPA seniors could be attributable in part to unmeasured characteristics such as motivation, persistence, or interest.<sup>23</sup>

For California taxpayers, the financial benefit of the CPA program in 2010 would have exceeded the cost even if only 60 percent of the higher graduation rate of CPA seniors was attributable to the effect of the program itself. Enabling more students to finish high school pays off for California taxpayers statewide because high school graduates pay more state taxes than dropouts, impose less cost on Medi-Cal and the criminal justice system, and are less likely to receive state welfare payments. A study for the California Dropout Research Project at UC Santa Barbara<sup>24</sup> conservatively estimated that these benefits to California taxpayers would amount to \$93,229 over the lifetime of each additional student who graduates from high school instead of dropping out. (This is the discounted present value, in 2010 dollars.) The difference between the 95 percent graduation rate for CPA seniors in 2010 and the 85 percent graduation rate for all seniors statewide implies that there would have been 1,213 fewer graduates in 2010 if the graduation rate for CPA seniors had been the same as the statewide rate. The fiscal benefit to California taxpayers from 1,213 additional graduates is more than \$113 million.<sup>25</sup> The cost to taxpayers of the CPA program in 2009-10 was \$67,814,732, including both the state grant and the required matching expenditure by local districts receiving the grants. Even if 485 of the 1,213 students would have graduated without the CPA program, there still would have been a positive financial benefit to taxpayers.<sup>26</sup>

A seven-year study of Linked Learning in California also has found positive results. A Linked Learning pathway embodies essentially the same combination of features as a career academy: an integrated sequence of CTE and college-prep academic coursework, along with work-based learning and student supports. As of year six, the study found that students in certified Linked Learning pathways outperformed similar students in the same districts on

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<sup>22</sup> David Stern, Phillip Saroyan, and Candace H. Hester (2012), *Comparing Students in Each California Partnership Academy with Non-Academy Students at the Same High School, 2009-10* (College & Career Academy Support Network, University of California, Berkeley).

<http://casn.berkeley.edu/resources.php?r=337&c=1>

<sup>23</sup> Another CCASN study found that only 52 or 53 percent of the students entering a CPA in grade 10 eventually graduate from that same academy. Most of those who leave the academy remain in the same high school or another California public high school. See David Stern, Phillip Saroyan, and Candace H. Hester (2013), *Longitudinal Description of Students in California Partnership Academies* (College & Career Academy Support Network, University of California, Berkeley).

<http://casn.berkeley.edu/resources.php?r=400&c=1>

<sup>24</sup> Clive R. Belfield and Henry M. Levin (2007), *The Economic Losses from High School Dropouts in California* (UC Santa Barbara, California Dropout Research Project Report #1, August). Available at

<http://cdrp.ucsb.edu/researchreport1.pdf>

<sup>25</sup>  $1,213 \times \$93,229 = \$113,086,777$ .

<sup>26</sup> The benefit to taxpayers does not include the additional after-tax earnings of the graduates themselves, which is a large benefit to them! Additional Federal taxes are among the other benefits also not included in this calculation.

credit accumulation and graduation rates.<sup>27</sup> Reports from previous years also found that students in certified Linked Learning pathways were more likely to report feeling engaged in and motivated by their schoolwork. In year seven,<sup>28</sup> the first results on postsecondary educational participation found that Linked Learning pathway students were as likely as similar students from traditional high schools to enroll in a two-year or four-year college — indicating that participation in a career-themed pathway did not diminish participation in postsecondary education. The pattern of positive results was particularly significant for students who had compiled poor records of performance before they enrolled in a Linked Learning pathway.

The Massachusetts regional vocational technical schools (RVTS) offer a combination of educational features that resemble Linked Learning or career academies — including academic coursework in addition to CTE, work-based learning and a setting in which students can develop strong relationships with their teachers. A study by Shaun Dougherty<sup>29</sup> took advantage of the fact that students must apply for admission to RVTS, based on a score computed from middle school academic performance, attendance, and disciplinary records, plus a rating by a middle school counselor and an interview with RVTS administrators. Dougherty's regression-discontinuity analysis compared applicants who were just below the cut-off score for admission with applicants who were just above the cut-off and were therefore admitted to RVTS. This analysis found significant positive impacts of RVTS participation, including a 15 percent boost in the high school graduation rate, and a 13 percent increase in the likelihood of earning an employment-related certificate. The effects were largest for students from lower-income backgrounds, who are disproportionately represented in RVTS.

A related research finding is that integrating CTE with academic instruction can improve students' mastery of the academic subject matter.<sup>30</sup> Students learn academic skills and content better when they have to apply it in a context that means something to them. The curricular integration in college-and-career pathways is not just a way to provide both academic and CTE coursework; it also facilitates more effective teaching and learning in the academic subjects themselves.

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<sup>27</sup> Warner, M., Caspary, K., Arshan, N., Stites, R., Padilla, C., Park, C., Patel, D., Wolf, B., Astudillo, S., Harless, E., Ammah-Tagoe, N., McCracken, M. & Adelman, N. SRI International. (2015), *Taking stock of the California Linked Learning District Initiative. Sixth-year evaluation report*; Menlo Park, CA: SRI International.

<sup>28</sup> Warner, M., Caspary, K., Arshan, N., Stites, R., Padilla, C., Patel, D., McCracken, M., Harless, E., Park, C., Fahimuddin, L., & Adelman, N. (2016). *Taking stock of the California Linked Learning District Initiative. Seventh-year evaluation report*. Menlo Park, CA: SRI International.

<sup>29</sup> Shaun M. Dougherty (2015), *The effect of career and technical education on human capital accumulation: Causal evidence from Massachusetts*. Storrs, CT: Neag School of Education, University of Connecticut.

<sup>30</sup> For an extensive and detailed discussion of the research and practice of integrating academic subjects and CTE, see chapter 4 in James R. Stone III and Morgan V. Lewis (2014), *Making High School Matter: Preparing Students for Careers and College*, New York: Teachers College Press.



In contrast to these programs or pathways that combine CTE with academic coursework, work-based learning, and student supports, VE or CTE course-taking *by itself* has usually been associated with lower academic performance during high school and less postsecondary educational attainment.<sup>31</sup> This pattern is largely attributable to the history of vocational education. As explained earlier in this paper, VE was explicitly developed in the 20<sup>th</sup> century as an alternative to college preparation, so high schools gave less priority to academic preparation for VE students. The pattern was compounded by over-representation of low-income and minority students in VE. Although contemporary CTE now enrolls a more representative cross-section of students than VE did a few decades ago, and academic under-performance of CTE students is less pronounced than that of VE students in the past, these patterns have not yet completely disappeared.

On the positive side, studies of VE and CTE have consistently found that high school students who complete a sequence of career-related courses are more successful in finding employment and earn higher wages in the years immediately following high school. The challenge is to ensure that these short-term gains in employment and earnings do not come at the cost of less postsecondary educational opportunity and reduced long-term career options. Avoiding that traditional tradeoff is the goal of programs that blend CTE with college preparation.

### **Implementing pathways that combine CTE with college preparation**

If a school district, state, or nation decides to develop high school pathways that combine CTE with college preparation, some guiding principles have emerged from four decades of experience in the U.S.<sup>32</sup>

- **Pathways keep students' options open.** College-prep academic coursework can be made available to all students willing to put in the effort, sometimes including access to college courses while students are still in high school. For these same high school students, a rigorous sequence of CTE coursework also can be made available, sometimes including access to industry-recognized credentials which help young people earn higher wages whether they enter full-time employment or work part-time while in college. If students decide to enter a field different from the high school pathway they started in high school, this would not be considered a failure because students presumably have learned transferable skills such as critical thinking and teamwork, which will be useful no matter what career they end up in.

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<sup>31</sup> For a recent, detailed compilation of research results on vocational education and CTE in the U.S., see David Stern (2016), *What's in a Pathway?* (College & Career Academy Support Network, University of California, Berkeley) <http://casn.berkeley.edu/resources.php?r=842>

<sup>32</sup> For a more complete explanation of these principles, see Mary G. Visher and David Stern (2015), *New pathways to careers and college: Examples, evidence, and prospects*. New York: MDRC.

- **The choice of pathway is up to the student and parents.** Because college and career pathways are designed to keep students' options open, they may be appropriate and beneficial for any student who chooses to enroll — not only for high-achieving students or only for low-achieving students. Ideally every pathway would enroll a fairly representative cross-section of students from the school or district.
- **Students receive personal support.** Some pathways are organized as small learning communities that are somewhat separate from the larger high school. For example, most career academies are small groupings of students within larger high schools, typically numbering 150 or 200 students in grades 9-12 or 10-12. This helps develop socially and academically supportive relationships among students and teachers.
- **Curriculum includes inter-disciplinary projects.** The standard high school curriculum consists of “units” of instructional time. To receive a diploma, a student must complete a minimum number of units in particular subjects, as specified by the state and local school authorities. To keep track of students' units, the school day is divided into periods, each period identified with a particular subject. Students proceed through the school day taking one subject after another, with no connection between subjects. This often fails to engage students' interest and also inhibits certain instructional strategies such as project-based learning. Pathways reduce the artificial separation of subjects through cross-disciplinary projects, assignments, and lessons.
- **Students engage in real applications.** Pathways often engage students in projects that have real value and relevance outside the classroom. Students build houses for sale, run restaurants or retail stores, conduct health clinics, operate child care centers, design web sites for nonprofit or government agencies, compile data and reports on local environmental conditions, fix cars, produce public service announcements, cultivate crops and raise livestock, among many other productive activities that have real and immediate value for other people. In contrast to traditional class assignments that are evaluated only by the teacher, these real projects have clients or customers outside the classroom, and are evaluated by the standards of adult professional work. Learning through actual productive activity was one of the strengths of traditional VE. Contemporary CTE continues that tradition, and in integrated pathways connects these activities to academic subjects as well.
- **Employer partnerships promote work-based learning.** Collaboration with employers and other community partners further reinforces the connection for students between high school and the world beyond. Employers play an important part in pathway programs, as curriculum advisors, mentors for students, and sponsors for work-based learning. They often offer a sequence of work-based learning experience, from classroom presentations by employers that promote career awareness, to career exploration through workplace visits and job shadowing, and on to actual career preparation in school-based enterprises and outside internships.

- **High schools collaborate with postsecondary education.** To create clear paths from high school to and through college, and help students take some steps along that path, career and college pathway programs have developed closer collaborations with local postsecondary institutions. These include providing better information to students about college requirements and possible courses of study; regularly reviewing students' transcripts to make sure they are on track to complete college requirements; organizing campus visits where high school students can see programs related to the theme of their pathway; helping students fill out applications for college admission and financial aid; creating articulation agreements so that some courses in high school can count for college credit; and enabling dual enrollment so that students start building a college transcript while still in high school.
- **Explicit quality standards and accountability promote data-driven decision-making.** As pathway models are replicated, it is important to ensure that new sites provide all the key elements, so that a program that calls itself a career academy or Linked Learning pathway is really offering the full experience that has been found to benefit students. The National Career Academy Coalition (NCAC), National Academy Foundation (NAF), and Linked Learning all have established and to a large extent aligned standards to guide implementation and assure quality. The NAF standards also include measures of students' performance in NAF courses and internships. Quality standards for California Partnership Academies are written into the authorizing legislation.
- **Strong intermediaries support program development.** Some career and college pathway models are supported by intermediary organizations. Some of these are national, such as NAF and NCAC. Others are local, such as Philadelphia Academies, Inc. and Academies of Nashville. ConnectEd California, the intermediary that pioneered the development of Linked Learning, has worked mainly in California but is now becoming national. The role of such intermediaries includes establishing standards and certification procedures, providing professional development and technical assistance, creating curriculum, and providing operational tools including web-based platforms.

As this list of principles suggests, creating pathways that effectively combine CTE and college preparation is not easy. But the evidence indicates that the effort can produce substantial benefits for students.