

Pathways or Pipelines: Keeping high school students' future options open while developing technical skills and knowledge

*Background paper for the Committee on The Supply Chain for Middle-Skill Jobs:
Education, Training, and Certification Pathways.*

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1. Introduction: issues to consider.

This paper describes work-related education in high schools, and offers suggestions about the role of high school programs in the supply chain for jobs that do not require a baccalaureate or higher degree.

Education for work at the high school level has changed dramatically since the mid 1980s. What used to be known as vocational education was rebranded as career and 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 20th century vocational education to 21st 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.”¹

Almost a century ago the 1917 Smith-Hughes Act first authorized federal funding for vocational education in high schools, despite objections at the time by John Dewey and others that creating a separate vocational curriculum would

¹ 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.

artificially separate theory from practice, and would lead to segregating students along socioeconomic lines.² The recent rebranding of vocational education as CTE was intended to overcome the problems Dewey and others correctly foresaw.

That history raises questions about the current movement to create pathways or pipelines from high school into middle-skill jobs that do not require baccalaureate degrees. Does creating pathways or pipelines into middle-skill jobs segregate preparation for baccalaureate education from preparation for non-baccalaureate postsecondary education, just as the Smith-Hughes Act bifurcated preparation for work from preparation for college? Will high school pathways or pipelines into middle-skill jobs involve another kind of tracking that forecloses students' options and curtails their choices? Will graduates from these programs be able to adapt to new opportunities when the technology they learned in school eventually becomes obsolete? Will high school programs leading to non-baccalaureate postsecondary education for middle-skill jobs also provide an option for students to continue on to baccalaureate and advanced degree programs if that is what they later decide to do? If these high school and non-baccalaureate pathways do not provide an option to continue at the baccalaureate level, will students be fully informed of that when they enter these programs in high school? And will these programs enroll disproportionate numbers of students from non-affluent households, or students with poor academic records?

Another set of questions relate to the feasibility and desirability of constructing efficient pipelines from high school into particular occupations or industries. Currently only one out of seven high school CTE concentrators go on to get a degree or certificate in the same field as their high school concentration.³ Is it feasible to increase that percentage? The Tech Prep initiative was introduced in 1990 to increase the flow of students from secondary to postsecondary vocational programs but did not have great success, and was defunded in 2011.⁴ Employers are now being asked to become partners in high school programs that will lead to non-baccalaureate preparation for middle-skill jobs, but what is the throughput rate that would produce an acceptable return on their investment? How can that throughput rate be increased without curtailing students' options?

² 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.

³ U.S. Department of Education, Office of Planning, Evaluation and Policy Development, Policy and Program Studies Service (2014), *National Assessment of Career and Technical Education: Final Report to Congress*. Washington, DC. Exhibit 6.6. A CTE concentrator is defined here as a student earning three or more CTE credits within a single occupational area.

⁴ For a summary of research on Tech Prep, and explanation of the relationship between Tech Prep and the newer Program of Study concept, see Chapter 5 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.

Middle-skill jobs are an important part of the U.S. economy, offering financially and personally rewarding careers. High school students who want to prepare for those jobs obviously should have that option. But at age 14 to 18 students can expect to be working for another 50 years or so, and no one can predict what labor market conditions and opportunities may exist that far in the future. Information on currently available openings for middle-skill jobs is crucial for designing programs to retrain workers who are already in mid-career, but is less relevant to designing high school pathways. High school students are best served by a kind of education that will enable them to adapt to future change, keeping their options open to the greatest extent possible.

Experience and research over the past several decades have demonstrated the feasibility of designing high school pathways that prepare students for both college and careers. These college-and-career pathways can help meet the demand for middle-skill jobs without curtailing students' long-term options. For instance, it is not unusual for students in high school pathways focused on health occupations to graduate with certificates as emergency medical technicians — and to be employed part-time as EMTs while working their way through college. Students in these pathways can continue their postsecondary education as far as they wish. This is important because most high school students — including a majority of CTE concentrators (see section 3 below) — expect to attain a bachelor's or advanced degree. By keeping students' options open, college-and-career pathways can appeal to a whole cross-section of the high school student population, and avoid sorting students according to their presumed future educational attainment.

Well-designed college-and-career pathways expand students' options by combining CTE and college-prep coursework with opportunities for students to take real responsibility in the world of adult professional work. The integration of theory and practice makes high school more interesting — sometimes even exciting — for many students, and increases the likelihood that they will become lifelong learners. Students who graduate from these pathways may or may not go on to postsecondary education in the same field as their high school concentration, and they may or may not choose to enroll in baccalaureate or advance degree programs. College-and-career pathways are designed to help students make these decisions based on their own interests and capabilities, and prepare them to adapt to ever-changing conditions in the labor market. The evolution of work-related education in high schools from vocational education to CTE has supported the development of such pathways, and evidence on positive student outcomes from these pathways has encouraged that evolution. Pathways appear to be a more promising strategy than pipelines for high schools to educate the next generation of productive citizens.

College-and-career pathways that keep students' options open include college-prep coursework in addition to CTE. A “program of study” as defined by the 2006 Perkins Act can provide the CTE backbone. A CTE program of study must:

“(i) incorporate secondary education and postsecondary education elements;

“(ii) include coherent and rigorous content aligned with challenging academic standards and relevant career and technical content in a coordinated, non-duplicative progression of courses that align secondary education with postsecondary education to adequately prepare students to succeed in postsecondary education;

“(iii) may include the opportunity for secondary education students to participate in dual or concurrent enrollment programs or other ways to acquire postsecondary education credits; and

“(iv) lead to an industry-recognized credential or certificate at the postsecondary level, or an associate or *baccalaureate degree*.” (Section 122(c)(1)(A); emphasis added)

College-and-career pathways that keep students’ options open solve a fundamental challenge for high schools arising from the fact that most students want to earn at least a bachelor’s degree but only about one-third actually do so. Section 5 explains that challenge more fully. To set the stage, the paper briefly reviews the history of the change from vocational education to CTE. Trends in enrollment and outcomes show that differences between CTE and other students are not as large as they used to be, but CTE still enrolls relatively large proportions of students who come from low-income families and have lower levels of prior academic performance. The paper also reviews evidence suggesting that CTE may be most beneficial for students when it is integrated with college-prep academic coursework and opportunities for high school students to take real responsibility in the world of adult work.

2. Evolution of high school vocational education to CTE.⁵

During most of the 20th 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.

⁵ 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.

The change from VE to CTE is apparent 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 2000.⁶ Thus almost all 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 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.⁷

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.⁸

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.

⁶ 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 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.

⁷ 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, 1984). Also Kearns, D. T. and D. P. Doyle, *Winning the Brain Race: A Bold Plan to Make our Schools Competitive* (San Francisco, CA: Institute for Contemporary Studies, ICS Press, 1988). 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.

⁸ For example, see Oakes, J., *Keeping Track: How Schools Structure Inequality* (New Haven: Yale University Press, 1985).

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) 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.⁹ The CCTC standards were intended to support the goal of transitioning to a CTE delivery system built around programs of study as defined by the 2006 Perkins Act. However, a 2013 study commissioned by NASDCTEc¹⁰ 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) This is part of the strategic choice explained in section 5 of this paper, between emphasizing pipelines that lead to specific jobs or emphasizing pathways that prepare students for a full range of postsecondary educational options and long-term career success.

3. Trends in participation in high school vocational education and CTE.

Three kinds of schools have offered VE and CTE to high school students: comprehensive high schools, full-time CTE schools, and area or regional CTE centers where students attend part-time for CTE instruction while taking academic courses at their home high school.¹¹ Nationwide, CTE programs are provided in about 9,500 comprehensive high schools, about 1,000 vocational high schools whose students enroll full-time and also take academic subjects, and about 800 area or regional vocational schools that generally offer only CTE courses.¹²

⁹ 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.”

¹⁰ 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.

¹¹ For an overview of secondary and postsecondary CTE institutions with an explanation of governance, see James R. Stone III and Morgan V. Lewis (2010), “Governance of vocational education and training in the United States,” *Research in Comparative and International Education* 5(3): 274-288.

¹² These figures are for 2000, from U.S. Department of Education, Office of the Under Secretary, Policy and Program Studies Service, *National Assessment of Vocational Education: Final Report to Congress* (Washington, 2004), p. 20. Stone and Lewis give similar but not identical numbers. The 2014 NACTE did not report numbers of schools.

National surveys of high school transcripts reveal the following trends¹³ in the percentage of high school graduates who:

	1982	1990	2000	2005	2009
Took at least one CTE credit	95	88	89	87	85
Took 3 or more CTE credits in the same occupational area (“concentrators”)	33	24	23	21	19

In 1982 CTE concentration was strongly skewed toward less affluent students, but this difference has diminished since then. The percentages of CTE concentrators among high school graduates from different socioeconomic and racial or ethnic groups were¹⁴:

	1982	1992	2004
Lowest socioeconomic quartile	40	31	21
Middle 2 socioeconomic quartiles	32	22	19
Highest socioeconomic quartile	15	10	12
Black	31	17	18
Hispanic	34	16	13
White	29	21	19

¹³ U.S. Department of Education, Office of Planning, Evaluation and Policy Development, Policy and Program Studies Service (2014), *National Assessment of Career and Technical Education: Final Report to Congress*. Washington, DC. Exhibit 2.2 shows data for 1990, 2000, 2005, and 2009. Data for 1982 are from U.S. Department of Education, Office of the Under Secretary, Policy and Program Studies Service, *National Assessment of Vocational Education: Final Report to Congress* (Washington, 2004), p. 25.

¹⁴ 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 NACTE), Table 8. Source note in Table 8 says: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

As the socioeconomic level of CTE concentrators has increased over time, so have their expectations for postsecondary education, but these are still lower than the expectations of other students. The percentages of CTE nonparticipants and CTE concentrators stating different levels of educational expectation in grade 12 were¹⁵:

	1982	1992	2004
Nonparticipants			
High school or less	8	1	3
Some college	25	15	13
Bachelor's degree	34	38	34
Graduate or professional degree	34	41	45
Don't know	—	5	5
Concentrators			
High school or less	29	10	8
Some college	50	41	28
Bachelor's degree	14	28	30
Graduate or professional degree	8	15	24
Don't know	—	7	9

4. Outcomes of high school vocational education and CTE.

Previous studies of the labor market outcomes of high school vocational education were usually limited to students who did not enroll in postsecondary education, because the jobs and earnings of students who are working their way through college do not reflect their eventual labor market outcomes. Looking at labor market outcomes a few years after high school, these studies found that high school graduates who took more CTE courses in high school obtained higher earnings. One of the most comprehensive studies was by Ferran Mane, who used three national longitudinal surveys to analyze labor market outcomes for high school graduates from 1972, 1980, and 1992.¹⁶ He compared the degree to which the total number of vocational courses and the total number of academic courses were each related to number of months employed in the year following graduation, the hourly wage, and annual earnings. He found the number of vocational courses taken in high school was more positively related to these labor market outcomes than the number of academic courses. The difference was generally greater for graduates in 1980 and 1992 than in 1972.

¹⁵ 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 NACTE), Table 19.

¹⁶ Ferran Mane, "Trends in the Payoff to Academic and Occupation-Specific Skills: The Short and Medium Run Returns to Academic and Vocational High School Courses for Non-College-Bound Students," *Economics of Education Review* 18 (No. 4, 1999), pp. 417-438.

It is difficult to make causal inferences about effects of high school CTE because participation in CTE is correlated with both observed and unobserved characteristics of students. One attempt to finesse the selection issue did not yield clear results, but another did. The first attempt, by Joseph Altonji, used the average number of courses in each subject taken by all students at a high school as an instrumental variable to predict the number of courses in that subject taken by each student at that high school.¹⁷ He also compared the results with ordinary least-squares regressions. The results using instrumental variables often differed from those using ordinary least squares, which may indicate that selection bias really is a problem. Surprisingly, what stood out as the best predictor of both post-high school wages and college attendance was the number of courses a student took in foreign languages. No other academic or vocational subject had a consistently significant association with wages. Altonji surmised that foreign language courses may contribute to “general skill development,” or else the result may be due to omitted variables or sampling error. Unfortunately, the findings and discussion do not inspire much confidence in the possibility of reaching clear conclusions from correlational data about how much CTE classes cause increases in earnings.

In contrast, a recent study by Shaun Dougherty¹⁸ focused on Regional Vocational Technical Schools (RVTS) in Massachusetts. All students in an RVTS participate in CTE, alternating a week of CTE with a week of academic instruction at the RVTS. Students must apply for admission to RVTS. Admission is 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. It is likely that RVTS applicants differ from non-applicants on some non-observed characteristics, such as planfulness or motivation, that would have a positive influence on their success whether or not they participated in RVTS. Two of Dougherty’s methods — ordinary least-squares regression with statistical controls for observed variables, and a “coarsened matching” procedure — cannot control for unobserved variables. His third method, a regression-discontinuity design applied to two RVTS that had more applicants than spaces, more effectively avoids differences in unobserved characteristics by comparing 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 the two 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 (Table 5). The regression-discontinuity results were sufficiently similar to the ordinary least-squares and coarsened matching results that Dougherty summarizes (pp. 16-17),

¹⁷ Joseph G. Altonji, “The Effects of High School Curriculum on Education and Labor Market Outcomes,” *Journal of Human Resources* 30(No. 3, 1995), pp. 409-439.

¹⁸ 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.

“students who participate in an RVTS have better graduation and enrollment¹⁹ outcomes, higher probabilities of earning industry-recognized credentials, and no difference in the probability of passing both exams required to earn a high school diploma than similar peers who do not attend these schools. The effects are largest for students from lower-income backgrounds,” who are disproportionately represented in RVTS.

As noted in section 6 below, the Massachusetts RVTS share some of the same features as career academies and Linked Learning. The Dougherty study may therefore represent evidence about integrated college-and-career pathways, not just CTE by itself.

The 2014 National Assessment of Career and Technical Education (NACTE)²⁰ analyzed the relationship between CTE course-taking in high school and several student outcomes. In general, data from nationally representative surveys show lower academic outcomes for students who take more CTE courses. However, three quasi-experimental studies and one random-assignment evaluation that control for student characteristics found no consistent effect of CTE course taking on academic outcomes. Therefore, most of the negative association between CTE course taking and academic outcomes can be attributed to the fact that students who take more CTE courses on average come from less affluent families and have lower prior academic achievement.

More specifically, NACTE found:

- Academic course taking increased for all students from 1990 to 2009, and the increase was greater among students who took more CTE courses, but the negative association between academic and CTE course taking remained large. The 2009 National High School Transcript Study found 45 percent of graduates who completed 4 or more CTE courses also completed the coursework deemed necessary to qualify for a 4-year college, compared to 74 percent of graduates who took no CTE at all (Exhibit 6.1). Two studies that controlled statistically for student characteristics found either minimal or no relationship between academic and CTE course taking. A random-assignment study in Philadelphia found students admitted to CTE high schools were more likely to complete a college-prep course sequence in math, but no difference in science or foreign language.
- CTE concentrators score lower on academic achievement tests than non-concentrators (Exhibit 6.2). For instance, 12th grade NAEP results in 2009 found 16 percent of CTE concentrators were proficient in math and 10 percent were proficient in science, compared to 31 and 24 percent of non-

¹⁹ Students begin RVTS in grade 9. The enrollment outcome here is persistence to grade 10.

²⁰ U.S. Department of Education, Office of Planning, Evaluation and Policy Development, Policy and Program Studies Service (2014), *National Assessment of Career and Technical Education: Final Report to Congress*. Washington, DC. Results summarized here are from Chapter 6, Student Outcomes.

- concentrators, respectively. Studies that use experimental or statistical methods to factor out the influence of student characteristics find little or no effect of CTE course taking on academic achievement test scores.
- There is no clear association between CTE course taking and high school completion. The fact that most CTE course taking occurs in grades 11 and 12 makes it difficult to study this relationship because a large proportion of students who drop out of high school do so in grade 9 or 10. The Philadelphia random-assignment study found higher graduation rates in CTE high schools, but studies that statistically controlled for student characteristics found mixed results.
 - CTE concentrators are less likely to participate in postsecondary education, and more likely to work for pay after high school, compared to non-concentrators. Two years after high school, the Education Longitudinal Study (ELS) found 70 percent of CTE concentrators had enrolled in postsecondary education, compared to 80 percent of non-concentrators (Exhibit 6.4). Conversely, 29 percent of concentrators had never enrolled but had worked for pay, compared with 18 percent of non-concentrators. The percentages varied by CTE field, with postsecondary enrollment rates highest among concentrators in information and health sciences, lowest in construction and transportation. Eight years after high school, 27 percent of CTE concentrators had earned a bachelor's or professional degree or certificate, compared to 39 percent of non-concentrators. On the other hand, 23 percent of CTE concentrators had earned a sub-baccalaureate degree or certificate, compared to 19 percent of non-concentrators (Exhibit 6.3). The Philadelphia random-assignment study found that attendance in CTE schools had a positive effect on postsecondary enrollment for some but not all cohorts. Other studies that controlled for student characteristics found mixed effects of high school CTE on postsecondary education.
 - Two years after high school, the ELS found 10 percent of CTE concentrators went on to postsecondary education in the same field as their high school concentration (Exhibit 6.5). Again there was considerable variation among specialties, from 19 percent in health sciences to 5 percent in consumer and culinary services. Eight years after high school, 14 percent of CTE concentrators had completed a degree or certificate in the same field as their high school concentration, ranging from 40 percent in health sciences to 4 percent in agriculture and natural resources (Exhibit 6.6).
 - Among high school graduates who did not enroll in any postsecondary education within two years after high school, the ELS found 69 percent of CTE concentrators were working at least 35 hours a week, compared to 62 percent of non-concentrators, and the CTE concentrators earned an average of \$10.04 an hour compared to \$9.59 for non-concentrators (Exhibit 6.7). Eight years after high school, among high school graduates with no postsecondary education the CTE concentrators still earned \$0.89 an hour more than non-concentrators (Exhibit 6.10). Among high school graduates who earned an undergraduate certificate the CTE concentrators earned \$1.30 more than concentrators. Somewhat surprisingly, among

those with associate's degrees CTE concentrators earned \$0.28 less than non-concentrators. High school CTE concentrators earned \$0.31 more than non-concentrators among those who had completed a bachelor's degree eight years after high school, and \$0.77 less among those who had completed a professional degree or certificate. Most of these wage differences between high school CTE concentrators and non-concentrators were too small to be statistically significant. The differences by level of postsecondary attainment were substantially bigger: average hourly wages were \$13.89 for graduates with no postsecondary education, \$16.14 with an associate's degree, \$18.87 with a bachelor's, and \$22.94 with a professional degree or certificate.

5. A core dilemma for high schools, and two alternative solutions.²¹

High schools face a fundamental dilemma. A large majority of high school students want to attain a bachelor's or advanced degree.²² Even among high school CTE concentrators, the last table in section 3 above showed that 54 percent in 2004 expected to earn a bachelor's or advanced degree — up sharply from 22 percent in 1982. 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.²³ Although some people with less schooling earn more than 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.²⁴ Most baccalaureate students are pursuing practical purposes.

²¹ 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.

²² Educational expectations of high school students were reported in US Department of Education, National Center for Education Statistics: *The High School Longitudinal Study of 2009*, NCES 2011-327, 2011. Degree completion rates by age group are reported in the annual *Digest of Education Statistics*.

²³ 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/>)

²⁴ 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

The fact that only about one out of three Americans completes a bachelor's degree by age 30 creates the dilemma, 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.²⁵ 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.

One proposed solution to this dilemma is to develop pathways from high school into jobs that require some postsecondary education but not a bachelor's degree. The highly influential *Pathways to Prosperity* report²⁶ has advocated this solution. The "program of study" concept defined by the 2006 Perkins Act, which has now eclipsed Tech Prep in federal legislation, is intended to facilitate seamless transition from high school into mainly non-baccalaureate postsecondary education.

However, this solution poses a risk of perpetuating chronic inequities and slowing the integration of CTE into the mainstream of the high school curriculum. Despite evolution from vocational education to CTE, high school CTE concentrators are still more likely to come from lower-income families, while students from higher-income families are more likely to attend college after high school. High school programs focused on non-baccalaureate jobs are likely to reinforce this pattern unless carefully designed to avoid this risk. Pathways that would prepare high school students to enter postsecondary training as CNC machine operators or radiology technicians can obviously benefit those students and the economy. But if those pathways do not also provide a future option for students to move from CNC machining into mechatronic engineering, for example, or from radiology tech to radiologist, or into other fields entirely, the pathways run the risk of being marginalized within the high school, as vocational education became marginalized in the past.

A potentially better solution is to prepare high school students for *both* employment *and* a full range of post-secondary educational options. Coursework required for four-year college admission can be available to all

history, which together account for 16 percent. Other non-occupational majors include mathematics and statistics, foreign languages, and liberal arts and sciences.

²⁵ 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).

²⁶ William C. Symonds, Robert B. Schwartz and Ronald Ferguson (February 2011), *Pathways to Prosperity: Meeting the Challenge of Preparing Young Americans for the 21st Century*. Report issued by the Pathways to Prosperity Project, Harvard Graduate School of Education.

students willing to put in the effort. Access to college courses while students are still in 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.

Ensuring that access to bachelor's degrees remains a real *option* for students in high school pathways does not mean trying to *insist* that all students complete requirements for four-year colleges or universities.²⁷ But it does mean that any pathway can appeal to students with baccalaureate or advanced degree aspirations — avoiding the segregation of students according to presumed future educational attainment. Similarly, a career-themed pathway does not require students at age 14 or 16 to make irrevocable choices about their life's work, but it does provide real preparation for employment. And by making the high school experience more coherent and meaningful, college-and-career pathways can strengthen student motivation and increase achievement.

6. Evidence from college-and-career pathways.²⁸

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.²⁹ Several studies in the 1980s and 1990s found that career academy students had

²⁷ For an articulate statement of the case against requiring all high school students to complete requirements for admission to bachelor's programs, see Robert B. Schwartz (2004), "Multiple pathways — and how to get there", in Richard Kazis, Joel Vargas, and Nancy Hoffman (eds.), *Double the Numbers: Increasing Postsecondary Credentials for Underrepresented Youth* (Cambridge, MA: Harvard Education Press). The debate about whether high schools should hold all students to the same standards goes back at least a hundred years. A brief recapitulation of that debate is in David Stern (2009), "Expanding policy options for educating teenagers." *The Future of Children* 19(1):211-239.

²⁸ The elements of college-and-career pathways are described in section 7 below. Parts of sections 6 and 7 also appeared in Mary G. Visher and David Stern (2015), *New pathways to careers and college: Examples, evidence, and prospects*. New York: MDRC.

²⁹ This evidence is summarized in David Stern, Charles Dayton, and Marilyn Raby, *Career Academies: A Proven Strategy to Prepare High School Students for College and Careers*. Berkeley, CA: Career Academy Support Network, University of California, 2010. http://casn.berkeley.edu/resource_files/Proven_Strategy_2-25-1010-03-12-04-27-01.pdf

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, 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.³⁰

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 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, 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.³¹ 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.³²

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.³³ 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

³⁰ Nan L. Maxwell, "Step to College: Moving from the high school career academy through the four-year university." *Evaluation Review* 25(6):619-654, December 2001.

³¹ James J. Kemple, *Career Academies: Long-Term Impacts on Labor Market Outcomes, Educational Attainment, and Transitions to Adulthood* (New York: MDRC, 2008). Amounts are in 2006 dollars.

³² 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 (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.

³³ Dayton, C., Hester, C.H., and Stern, D., *Profile of California Partnership Academies 2009-10* (College & Career Academy Support Network, University of California, Berkeley, 2011) <http://casn.berkeley.edu/resources.php?r=293&c=1>

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 10th and 11th graders generally do come from families with lower income and lower parental education, compared with non-academy students in the same high schools.³⁴ However, the positive outcomes for CPA seniors could be attributable in part to unmeasured characteristics such as motivation, persistence, or interest.³⁵

An ongoing study of Linked Learning in California also has found positive results.³⁶ A Linked Learning pathway embodies virtually 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. The ongoing study is evaluating a multi-year effort to make these pathways available to all or most high school students in nine school districts.³⁷ As of year 5, the study found that students in certified Linked Learning pathways outperformed similar students in the same districts on credit accumulation and being on pace to complete coursework required for admission to California State University or the University of California. Students in certified Linked Learning pathways were also more likely to report feeling engaged in and motivated by their schoolwork.

The study by Shaun Dougherty³⁸ described above in section 4 also may provide evidence relevant to college-and-career pathways. The Massachusetts regional vocational technical schools (RVTS) provide academic coursework in addition to CTE. Students also participate in work-based learning and develop strong relationships with their teachers. This combination of features is very similar to career academies and Linked Learning.

Research on early college high schools and dual enrollment is also relevant to the development of college-and-career pathways. Several studies

³⁴ Stern, D., Saroyan, P., and Hester, C.H., *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, 2012) <http://casn.berkeley.edu/resources.php?r=337&c=1>

³⁵ 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 Stern, D., Saroyan, P., and Hester, C.H., *Longitudinal Description of Students in California Partnership Academies* (College & Career Academy Support Network, University of California, Berkeley, 2013) <http://casn.berkeley.edu/resources.php?r=400&c=1>

³⁶ Guha, R., Caspary, K., Stites, R., Padilla, C., Arshan, N., Park, C., Tse, V., Astudillo, S., Black, A., & Adelman, N. (2014). *Taking stock of the California Linked Learning District Initiative. Fifth-year evaluation report*. Menlo Park, CA: SRI International.

³⁷ ConnectEd (2015), “California Linked Learning District Initiative.” Accessed March 13 at http://www.connectedcalifornia.org/schools_districts/district_initiative.

³⁸ 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.

have found that enabling students to take college courses while in high school increases high school graduation rates and completion of postsecondary programs.³⁹ Some current initiatives, including the Pathways to Prosperity network and the California Career Pathways Trust, are combining the ideas of career academies and early college approaches in the design of pathways from high school to community college.⁴⁰

An important finding in the research is that integrating CTE with academic instruction can improve students' mastery of the academic subject matter.⁴¹ 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.

7. Make it real, make it fair: elements of college-and-career pathways.

College-and-career pathways keep students' future options open by giving them access to coursework required for the full range of postsecondary institutions including baccalaureate programs, while at the same time providing a sequence of CTE courses that prepares them for employment. These pathways also have a number of other features.

The choice of which 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. Pathways are not generally intended only for high-achieving students or only for low-achieving students. Every pathway could enroll a representative cross-section of students from the school or district.

Allowing students — and teachers — to participate by choice is relatively easy when a large high school contains only one or two pathway programs. But when a school or district policy requires all or most students and teachers to enroll in pathways, allowing completely free choice becomes more difficult. Some high school students, families, and teachers simply do not want to participate in a career-themed program of study. This implies that the benefits of career and college pathways may be greatest when not all students and teachers are required to participate.

There also may be a tradeoff between choice and open access. Some pathways may attract certain types of students. For instance, pathways focused

³⁹ A brief summary of that research is in Mary G. Visher and David Stern (2015), *New pathways to careers and college: Examples, evidence, and prospects*. New York: MDRC.

⁴⁰ See <http://www.jff.org/initiatives/pathways-prosperity-network>

⁴¹ 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.

on fashion design, child development, or health care still tend to enroll more girls, while construction, engineering, and manufacturing enroll more boys. The undesired consequence is that some boys who could excel in health care, or girls with a talent for engineering, would not choose those pathways because they don't want to seem "weird."

Ethical, political, and legal issues can arise, especially when enrollment patterns are associated with race, language, family income, or prior achievement. If students who choose the engineering pathway are mainly Asian, and those who choose a construction pathway are mainly Latino — or vice versa — the school or district would be under some obligation to disrupt that pattern, by concerted outreach or perhaps using a lottery to assign some students to pathways.

Personal support for students. 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. Students receive more personal academic and social support in this situation because a small team of teachers shares responsibility for the same cohort of students over a period of three or four years. Ideally, teachers are scheduled to have common planning time, to coordinate their curriculum and also exchange information about students. Academy teachers come to know their students well, and are therefore more able to provide individual support. As one career academy teacher remarked, "When you have students for a year, they're on your mind. When you have them for three years, they're on your conscience."

In career academies and some other pathways, students are scheduled to take some classes together as a cohort, and ideally those classes enroll only academy students. Usually the academy classes each year include one career-technical class along with one to three classes in academic subjects. Cohort scheduling allows teachers to develop cross-disciplinary projects, lessons, and assignments that integrate academic and technical content, making the academic subjects more interesting for students and creating coherence in the curriculum. Students who take several classes together also can develop a positive group identity and give one another academic and social support. It can be surprisingly difficult to schedule a cohort of students to take all or even most of their classes together each year, and in the right sequence from one year to the next. Scheduling a common planning period for pathway teachers adds to the challenge.⁴²

Integrated curriculum. The standard high school curriculum consists of "units" of instructional time. To receive a diploma, a student must complete a minimum number of units or credits 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 — first period

⁴² Tools and procedures for scheduling high schools with pathways are available at http://casn.berkeley.edu/master_schedule_guide.php?r=412&c=28

biology, second period Spanish, third period math, or whatever — with no connection between subjects. Not surprisingly, this approach to learning often fails to engage students' interest and also inhibits certain instructional strategies such as project-based learning.

Scheduling a cohort of students to take several classes together each year can help overcome the artificial separation of subjects. In a health pathway, for example, teachers who instruct the same group of students in health occupations, biology, and social studies classes can integrate those subjects in a project dealing with a topic such as communicable disease and public health policy. Math teachers who have a cohort of pathway students in one of their classes can easily find connections with CTE teachers in fields such as construction, engineering, agriculture, business and finance. Interdisciplinary lessons or projects can bring academic subjects to life, and help students see the relevance of school subjects to the world beyond high school. Teachers in career academies have been using this kind of integrated curriculum for decades.⁴³

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 activities that have real and immediate value for other people. In contrast to most class assignments, which are read and evaluated only by the teacher, these 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 vocational education. Contemporary CTE continues that tradition, and in integrated pathways connects these activities to academic subjects as well.

The integrated, applied teaching and learning in college-and-career pathways requires more planning and coordination than the standard curriculum, which mainly leaves individual teachers to organize their own work. If integrated curriculum with real applications were easy to do, it would probably be standard practice. But there is reason to expect that these more complex teaching and learning practices will become more widespread. The Common Core State Standards, which emphasize application of knowledge and synthesis of information, provide an incentive for more high schools to overcome the inertia of the standard curriculum.

Employer partnerships and 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

⁴³ A searchable database with examples of integrated curriculum is available at <http://casn.berkeley.edu/curriculum.php>

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. Pathways provide work-based learning related to its particular theme, further reinforcing for students the value of what they are studying in school.

Quality career exploration and work-based learning experiences in which all students can participate are difficult to implement at scale. Teachers typically lack the skills and experience to recruit and collaborate with local employers. Teachers also lack time to do the considerable legwork to make this happen. Intermediaries that work to connect schools with employers, create and monitor internships, and handle logistics and compensation, are often the solution. Tools and teaching materials are becoming increasingly available as well, such as a program developed by MDRC called *Exploring Career and College Options*, now used by ConnectEd in the Linked Learning Initiative.⁴⁴

Collaboration between high schools and postsecondary education. To create clear paths from high school to 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.

District support. As the number of college and career pathways has increased, districts have become more involved, and for some approaches, drive the process. The district role includes selecting pathways that are tied to growing sectors in the local economy, communicating to parents and the community what college and career pathways are all about; coaching and other assistance to pathway lead teachers and other school site leaders; updating curriculum and aligning it with new standards; ensuring that the evaluation of principals includes how well they manage the complexity of pathway implementation; helping to recruit and organize employer partners; and handling logistical issues around work-based learning.

High standards, accountability systems and 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 experience. 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. As

⁴⁴ See <https://www.connectedstudios.org/ecco>

states continue to modify their accountability procedures to take into account high school graduates' readiness for college and careers, students' successful completion of a career and college pathway can be used as an accountability measure if pathways have been certified as meeting quality standards. Finally, data systems that are both accessible and sophisticated are needed to continuously measure progress in achieving key milestones in pathway development and student outcomes.

Teacher credentialing and preparation. Expanding the number of college-and-career pathways will increase the demand for CTE teachers, who are already in short supply.⁴⁵ For instructors in both CTE and academic subjects, teaching in a college-and-career pathway also creates new demands. Integrating academic and CTE content through multi-disciplinary projects, lessons, and assignments requires collaboration among teachers of different subjects. Federal, state, and local certification requirements can make it difficult to determine whether the instructor in a multi-disciplinary course should have an academic or CTE credential.⁴⁶ In addition, to connect classroom instruction with work-based learning, teachers of academic subjects need some understanding of the content, technology, and organization of work in their pathway field. To prepare new teachers for college-and-career pathways, several campuses of the California State University system now include an introduction to Linked Learning and placements in pathways as part of their pre-service teacher education programs.⁴⁷ Some districts provide externships for existing teachers to learn about the industry or career field of their pathway.⁴⁸

Strong intermediaries to support programs. Some career and college pathway models are supported by intermediary organizations. Some of these are national, such as NAF, NCAC, and Jobs for the Future (JFF). Others are local, such as Philadelphia Academies, Inc. and Academies of Nashville. ConnectEd California, the intermediary that has developed the field of Linked Learning, has worked mainly in California but is now becoming national. The role of such intermediaries includes establishing standards, providing professional development and technical assistance, creating curriculum, and providing operational tools including web-based platforms.

⁴⁵ National Association of State Directors of Career Technical Education Consortium (2009), *Teacher Shortage Undermines CTE*. Silver Spring, MD: NASDCTEc.

⁴⁶ Annie Johnston and David Stern (2014), *Coursework for College & Career Pathways: Dual Academic/CTE Courses*. (College & Career Academy Support Network, University of California, Berkeley) <http://casn.berkeley.edu/resources.php?r=774&c=1>

⁴⁷ Nancy Farnan, Paula M. Hudis, and Arlene LaPlante (2014), "Changing teacher preparation for California's changing secondary schools," *Issues in Teacher Education* 22(2): 155-174.

⁴⁸ *Teacher Externship Guide*. (College & Career Academy Support Network, University of California, Berkeley) <http://casn.berkeley.edu/resources.php?r=251&c=>

8. Some possible implications for Perkins reauthorization.

High school CTE is vital to achieving the goal of preparing students for further education and rewarding careers that may include employment in middle-skill occupations. Reauthorization of the Perkins Act is an opportunity to consider how CTE can best contribute to achieving that goal.

Evidence summarized in this paper indicates that high school CTE can be most effective as part of a college-and-career pathway that prepares students for a full range of postsecondary educational options, including both baccalaureate and non-baccalaureate programs. Embedding a sequence of CTE courses in this kind of college-and-career pathway is consistent with the purpose of a reauthorized Perkins act proposed by the National Association of State Directors of Career Technical Education Consortium (NASDCTEC): “to develop the academic and CTE skills of students to ensure America’s global competitiveness through programs of study, partnerships with employers, and further education and careers.”⁴⁹

Similarly, the Independent Advisory Panel for the 2014 National Assessment of Career and Technical Education also offered recommendations for a reauthorized Perkins Act. The first was:

- “Eliminate bureaucratic and financial incentives for maintaining CTE as a silo of isolated activities. Instead, promote integration of CTE activities within mainstream education reforms.”

This was a response to the Panel’s concern that “policymakers continue to address CTE as a separate, discrete area of education with its own funding, evaluation, and accountability rules. Rather than protecting or strengthening CTE, this arrangement has isolated CTE from mainstream education reform.”⁵⁰

One way to address this concern would build on one of NASDCTEC’s recommendations:

- “Consortia – Coordination and collaboration between secondary and postsecondary partners is essential and must be improved. The federal CTE legislation should incentivize consortia of secondary and postsecondary eligible entities to better facilitate coordination and transitions between learner levels. States should have the flexibility to structure consortia in a way that best meets the needs of their state in terms of governance, funding, and geographic factors.”

⁴⁹ National Association of State Directors of Career Technical Education Consortium (2015), *Recommendations for the Reauthorization of the Carl D. Perkins Career and Technical Education Act*, Silver Spring, MD: National Association of State Directors of Career Technical Education Consortium.

⁵⁰ 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.

A specific possibility would be to explicitly allow states to include institutions that offer baccalaureate degrees among the postsecondary partners in a state or regional consortium. This would promote the development of high school pathways that lead to a full range of postsecondary and career options. It would facilitate the design of pathways from high school to both non-baccalaureate and baccalaureate postsecondary education, keeping students' options open and making these pathways attractive to the large majority of students who aspire to earn bachelor's degrees.

Including institutions that award bachelor's degrees as eligible recipients of Perkins funding would be a departure from past practice. Currently eligible recipients — secondary and two-year postsecondary institutions — would presumably not welcome enlarging the pool of eligible recipients, unless the total amount of Perkins funding increases. That is not impossible, if Perkins becomes more closely connected to mainstream education reform as the NACTE Advisory Panel recommended.

CTE has a great deal to offer, both as preparation for employment and as a method of instruction. There is evidence that integrating academic and CTE curriculum can improve high school students' learning in core academic subjects. This and other evidence summarized in section 6 indicates that CTE can be most beneficial for high school students when it is delivered as an integral component of college-and-career pathways that prepare students for postsecondary educational options including both baccalaureate and non-baccalaureate programs, and for rewarding careers in a whole range of occupations.