

Career and Technical Education in the Second Decade of the 21st Century

James R. Stone III

One of the fundamental assumptions about adulthood in the United States is the expectation that adults work, they have a career, and they contribute to the overall economy. The pathway by which children become adolescents who become contributing adults is influenced by a number of factors, not the least of which is education.

The debate over the role of secondary education in this process has been raging for over a century, and at the heart of these arguments is what Lewis (2000)(Lewis, Stone, Shipley & Madzar, 1998) describes as education's basic dilemma: the conflicting functions of maximizing each student's potential while simultaneously selecting and socializing all students for their future occupational roles (and consequent place in society). Hyslop-Margison (2000) frames these conflicting roles as those of education for democracy versus education for social efficiency. Early in the 20th century, as the economic base of American society shifted from agricultural to largely industrial, schools were forced to adopt new education techniques for students who were to become the future workforce. In 1907, President Roosevelt urged school reform that would provide industrial education in urban areas and agricultural education in rural areas. The president, according to D. Tanner and L. Tanner, thought this would enhance

domestic competitiveness and socialize youth into their appropriate economic roles.²⁹

This began a debate that continues to this day: what is the best strategy (morally, politically, economically, socially) to prepare students for the career challenges that they will face? In these early debates, the two dominant approaches were represented by John Dewey and David Snedden. Dewey argued for vocational education to be included as part of a comprehensive curriculum that would help students expand their range of personal skills, rather than taught as a set of occupation-specific skills that would limit students' occupational options. According to Dewey, the purpose of education was to provide the skills and competencies necessary for the integration of work, family, and community life. Snedden argued for vocational training structured to direct non-academic students into the occupation for which they were best suited, and that would best fulfill the specific needs of the labor force.³⁰ Lewis (2000)(Lewis, et al., 1998) argued that vocational education at the secondary level, and the community college at the post-secondary level, represent attempts by society to resolve this dilemma as fairly as possible.

In 1910, the American Federation of Labor (AFL) joined with the National Association of Manufacturers (NAM) to ensure the working class was represented in education policy. They succeeded, and a commission was appointed to study whether and in what form vocational education should receive federal aid. The com-

²⁹ D. Tanner, and L. Tanner, *Curriculum Development: Theory into Practice*, (New York: Macmillan, 1980).

³⁰ D.F. Labaree, "How Dewey lost: The Victory of David Snedden and Social Efficiency in the Reform of American Education." Paper presented at the conference on *Pragmatism as the Reticle of Modernization: Concepts, Contexts, Critiques*, Centro Stefano Franscini, Monte Verità, Ascona, Switzerland, September 2008.
https://web.stanford.edu/~dlabaree/publications/How_Dewey_Lost.pdf

mission's report, consistent with Snedden's perspective, recommended narrowly focused vocational training as the proper vehicle by which to help non-academic students contribute to the workforce upon completion of school. President Wilson signed the Smith-Hughes Act into law in 1917, which established federal funding for vocational education in the form of specific, skills-based training programs in the areas of agriculture; trade and industries; and home economics (Hyslop-Margison, 2001). In a very real sense, Snedden won the debate.

The aftermath of World War II and the changed social and economic conditions resulting from the war spurred further debate about the appropriate role of vocational education. In 1944, the National Education Association's Education Policies Commission launched a program titled *Education for ALL American Youth*, which advocated a broad range of vocational programs designed to prepare high school students for the labor force, and which also included a component of supervised work experience. In contrast to the programs developed under the Smith-Hughes Act, this new proposal called for a broad-based curriculum to allow for flexibility in responding to changing labor market conditions, and did not require students to be streamed into either an academic or a vocational track, but rather allowed for integration of the two.³¹ It failed to move public policy discussions, however, so vocational education remained relatively unchanged.

The education conversation abruptly changed following the Soviet's 1957 launch of the Sputnik, an event that created our first STEM panic. Desperately concerned that the USSR was producing more scientists than the United States, the Congress passed the National Defense Education Act (NDEA) in 1958 which focused federal policy and resources on expanding engineering and technology programs

and emphasized moving more youth to college. There is, the Act stated, "an insufficient proportion of our population educated in science, mathematics, and modern language and trained in technology."³²

This was followed in a few short years by a report to President Kennedy from an expert panel that concluded that a large percentage of high school students were neither prepared for college nor for the opportunities provided in the workplace. This in turn led to the 1963 Vocational Education Act with an emphasis on preparing youth for gainful employment.³³ Amendments during the 1960s and 1970s did not make major changes to the 1963 Act other than to increase the focus on specific student categories (e.g., special needs).³⁴ This Act was and remains the largest single federal investment in secondary education. The current much amended version has the shorthand title of Perkins IV.³⁵

College-for-All

In 1983, the conversation around American education changed, again. A report commissioned by the federal government attacked public education as leading the United States to economic ruin. *A Nation at Risk* transformed thinking about public education in the United States.³⁶ It provided the memorable phrase, a *rising tide of mediocrity* that threatened our children and our nation's future (p. 9). It accelerat-

³² National Defense Education Act of 1958, PL 85-864.

³³ Tanner and Tanner, *Curriculum Development*.

³⁴ H.R.D. Gordon, *The History and Growth of Career and Technical Education in America*, (Long Grove, IL: Waveland Press, Inc., 2014).

³⁵ *Carl D. Perkins Vocational and Technical Education Act* (Perkins IV), (Washington, DC: U.S. Government Printing Office, 2006).

³⁶ National Commission on Excellence in Education, *A Nation at Risk: The Imperative for Educational Reform*. (Washington, DC: U.S. Government Printing Office, 1983). NCES 2013-001.

³¹ D. Tanner, and L. Tanner, *Curriculum Development: Theory into Practice*, (New York: Macmillan, 1980).

ed the growing emphasis on sending more youth to college and contributed to a college-for-all mindset that began to dominate the education conversation. One education pathway for all students became the assumed paradigm. Within this context, vocational education was increasingly seen as lower priority. More and more parents and indeed students themselves began to view college as the only viable post-high school option.

mediocrity” moved into the labor market in the 1990s and helped generate the longest sustained economic boom in our history. It is also interesting to note that concerns about our economic competitiveness in 1983 were expressed in the context of fears about Japanese and German companies outperforming American companies, due in large part to the superior quality of their education systems. Today, concerns about economic competitiveness are expressed

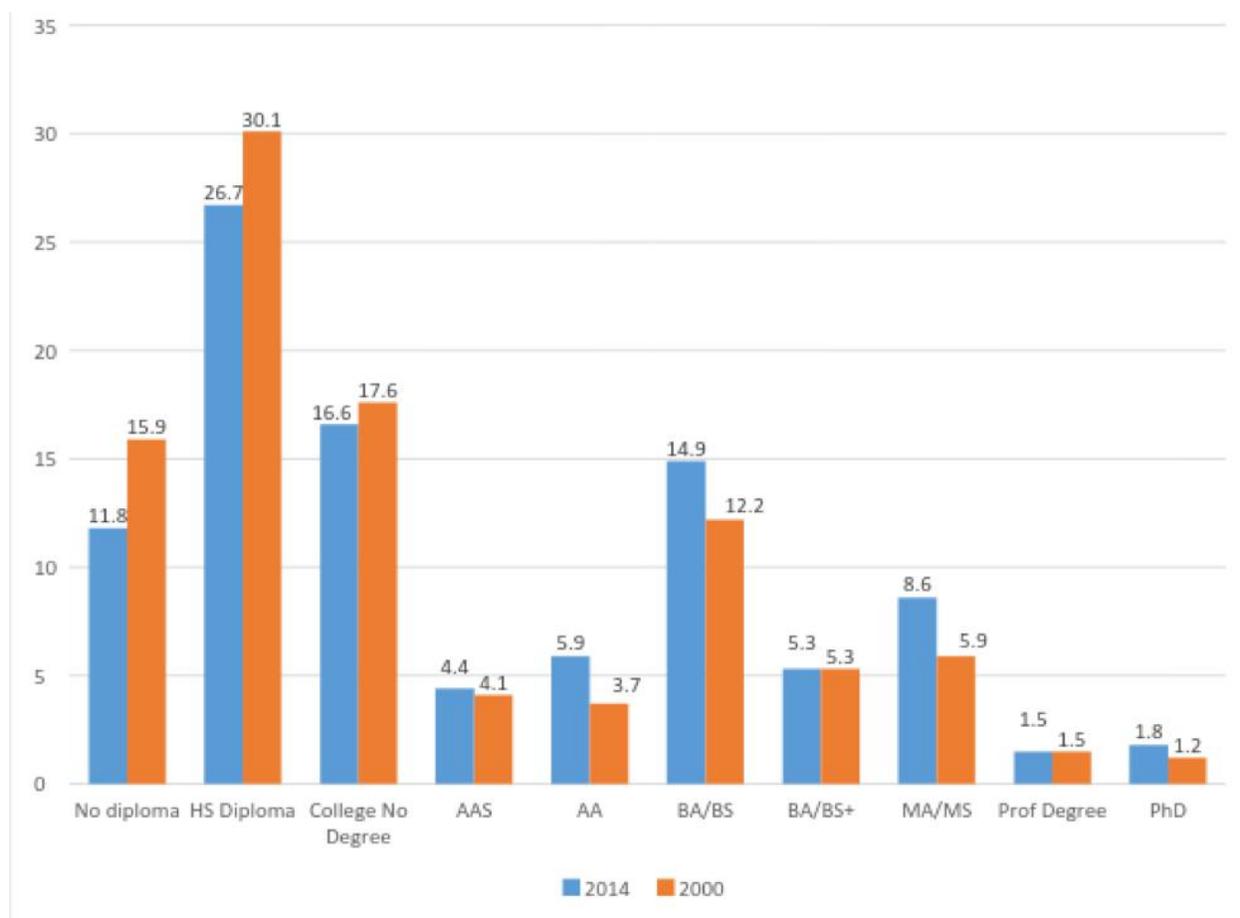


Figure 1. Academic Credential Growth 2000 to 2014³⁷

It is with some irony then that the generation of children put at risk by “a rising tide of

as concerns about competition from China, as well as other countries where workers are paid little, have little voice, and whose educational systems are not considered worthy of emulation.

An examination of the data shows that this singular focus on moving all students to college has produced changes. Between 2000 and 2014,

³⁷ Source: http://nces.ed.gov/programs/coe/indicator_caa.asp

the percentage of adults in the population with college academic credentials has increased, as shown in Figure 1 below. While we are moving more youth to college, today more than half who begin 9th grade do not obtain an associate's degree or higher in the years following graduation.

Blindly assuming however, that college is the key to economic success is to oversimplify a complex set of relationships. As Whitehurst (2010) observed, while there is a small, consistent correlation between years of schooling and long-term economic growth the variability in the data is striking. He notes for example that Germany has a much stronger economy than France but only half the number of college graduates. France, like the United States, has been increasing its percentage of college graduates over the past 10 years while Germany has not. Despite this, German economic growth has exceeded that of France during this period. As noted earlier, the U.S. saw historic economic growth during a period when college completion rates were considerably lower than they are today, but gross domestic product grew at nearly double today's rate.³⁸ All this argues that the connections between the economic health of a nation and its education system at any given time is tenuous at best.

CTE Today

Despite the data, assumptions about the demise of U.S. economic competitiveness remain connected to education. The U.S. economy, in the past decade, did lose its spot as the most competitive in the world, but it remains third in the world behind Switzerland and Singapore. However, the factors identified with this decline have little to do with education. Although education is a contributing factor, more relevant are labor-employer relations, flexibility of wage

determination, the participation of women in the workforce, infrastructure issues, and worker health.³⁹ The nation with the highest percentage of college educated adults? Russia.

It is useful to recognize that the United States has no national system of education.⁴⁰ Instead of a national system, the 50 states serve as primary governing bodies, making and carrying out education policy. In many states, local school districts are the primary leaders in education. So in place of a national authority exerting a governance function over all of education as we find in most industrialized nations, in the United States, schools, state and local governments, and business organizations, operating in very loose partnerships with the federal government, have sought to support youth in successfully and efficiently transitioning from public education to further education or the workplace. The federal government has only minimal influence on public education, and then only through achievement standards or other incentives (e.g., Race to the Top funding) tied to federal grants. Understanding *career and technical education* (CTE) in the United States should begin with an understanding that the United States has no national CTE system. American CTE is a non-system built upon a series of ad hoc fixes begun in 1917, as briefly described in the preceding section.

³⁸ <http://www.multpl.com/us-gdp-growth-rate>

³⁹ K. Schwab, and X. Sala-i-Martin, *The Global Competitiveness Report 2005-2016*, (Geneva: World Economic Forum, 2016).

⁴⁰ J.R. Stone III, "The Non-System of VET in the United States," *Reflections on TVET in the United States from a German and US perspective (Deutsche und US Amerikanische Einsichten zur Berufsbildung in den US.)*, ed. A. Barabasch and F. Rauner, (New York: Springer Press, 2012), 231-250.

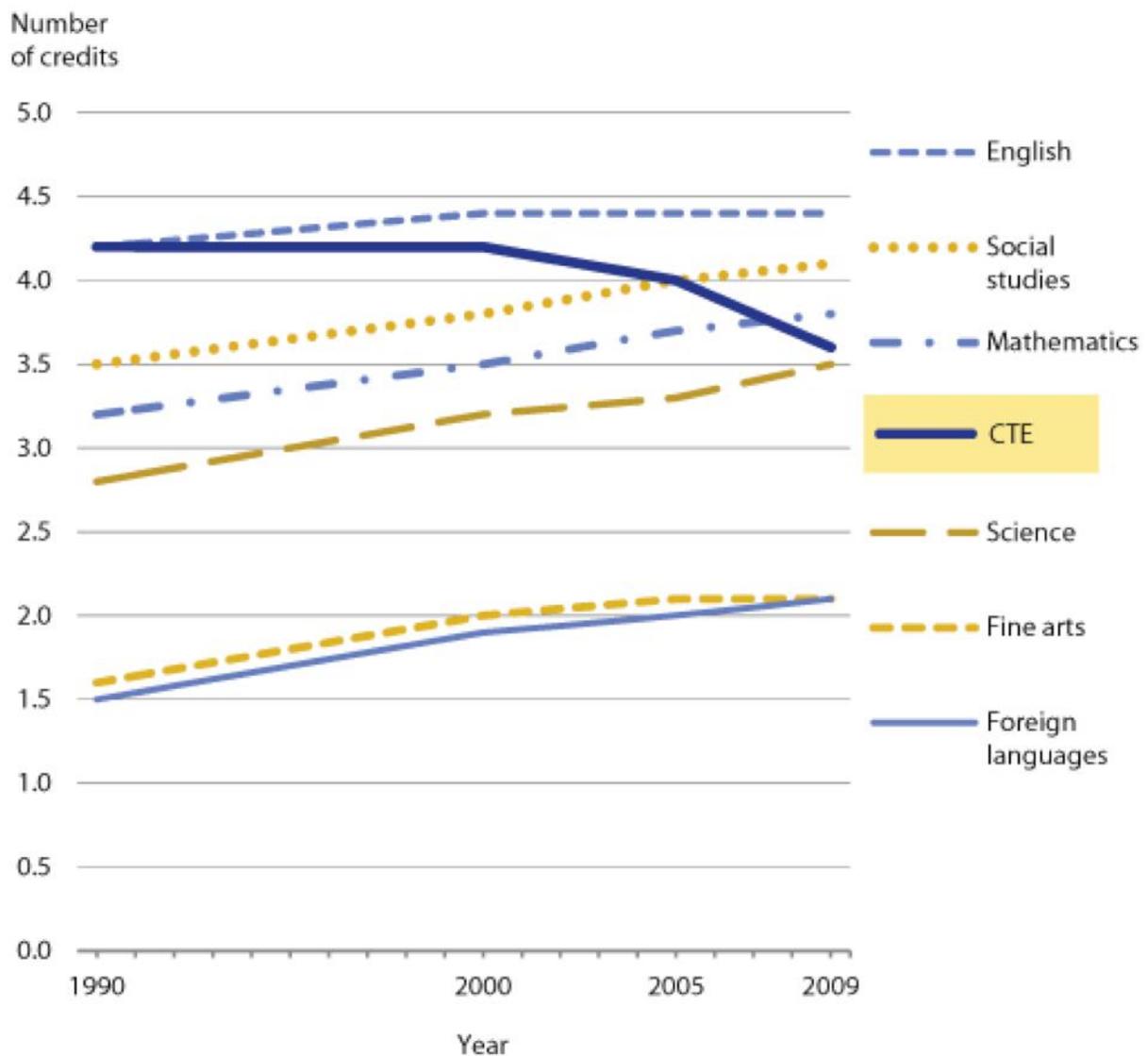


Figure 2. Credit Trends in U.S. High Schools 1990 to 2009⁴¹

This non-system of CTE is delivered through different systems in different states. Across the United States CTE is provided in more than 9,000 high schools, 1000 CTE or technical high schools and approximately 800 regional technical centers where students typically spend a half-day, with the other half spent

in their home high school taking academic subjects. It is reasonable to assume in this complex of school types and different governing bodies that the consistency of offerings is limited and quality cannot be assumed.⁴²

CTE, however, is not immune to overall trends in education thinking. Despite evidence to the contrary, global competitiveness argu-

⁴¹ Source: http://nces.ed.gov/surveys/ctes/figures/fig_01.asp

⁴² J.R. Stone III, and M.V. Lewis, "Governance of Vocational Education and Training in the United States," *Research in Comparative and International Education* 5, no. 3 (2010): 274-288.

ments continue to be used as a means of promoting a strictly academic curriculum in high school—one designed solely to prepare students to pursue a four-year college degree—as the best and only educational option.⁴³ The college-for-all mindset had a profound effect on what was then called vocational education—a term still used by the rest of the world, while the U.S. now favors the CTE label. Shop and home economics classes were widely available into the 1980s but were considered a dumping ground for the less able, rather than a pathway to meaningful employment opportunities (Jacoby, 2013).

Figure 3. Changes in Student CTE *Enrollments*⁴⁴

In the decade before the advent of NCLB, CTE enrollments held fairly constant (Figure 2) despite the growing standards movement. However, beginning around the year 2000, CTE enrollments began to decline. By contrast, enrollments in academics increased as did overall credits earned by the average high school graduate from 23.5 in 1990 to 26.9 in 2009, the last year federal data are available. It is reasonable to assume the trend has continued.

The decade and a half of No Child Left Behind (NCLB, 2001) with its heavy focus on testing in two subject areas and linking that to school accountability further eroded the public's perception of CTE (Jacoby, 2013). Many of NCLB's early advocates eventually concluded that the Act created more harm than it did good (Ravitch, 2010). This college-for-all mentality has had the pernicious effect of diminishing the presence of high school CTE during a time when policy makers, especially at the state level, were beginning to recognize the need for multiple options for students.

Not only have overall CTE enrollments declined as average credits earned has risen, the mix of CTE course taking has changed (Figure 3). With the exception of health care, none of the programs experiencing growth are identified as high demand, nor in many cases high wage or high skill. CTE programs linked to high demand careers or careers offering high wages (e.g., computer technology, engineering, manufacturing), which are the focus of national and state workforce development efforts, are in decline as shown in Figure 3.

College and Career Readiness

These trends are occurring during a period of renewed interest in, and emphasis on, encouraging more students to exit high school prepared to continue their formal learning beyond high school and/or move into the workplace. The “college for all” approach that characterized the previous three decades evolved in recent years to incorporate the idea that public education ought to prepare youth for college *and* careers. College and career readiness is a phrase that has captured the imagination if not the vocabulary of state and federal policymakers in the United States. President Obama has called for all students to receive some kind of education and training for the workforce.

To effect his vision would require the creation of a seamlessly integrated P-16 educational system that includes workforce development, economic development, welfare reform, and adult education programs. Such a fusion of education systems with the demands of the modern marketplace stands in marked contrast to the nation's current preoccupation with four-year college degrees. In this conversation, CTE has emerged as an important part of secondary education. Evidence of this is that more than 30 governors included increases in CTE fund-

⁴³ J.E. Rosenbaum, J.L. Stephan, and J.E. Rosenbaum, “Beyond One-size-fits-all College Dreams,” *American Educator*, (Washington, DC: American Federation of Teachers, AFL-CIO, 2010).

⁴⁴ Source:

http://nces.ed.gov/surveys/ctes/figures/fig_02.asp

ing in their state budgets for 2016⁴⁵ and J.P. Morgan Chase recently announced a \$75 million investment to support career pathways.⁴⁶

tion advocacy organizations define this as the knowledge and skills in English and mathematics necessary to qualify for and succeed in entry-level, credit-bearing postsecondary course-

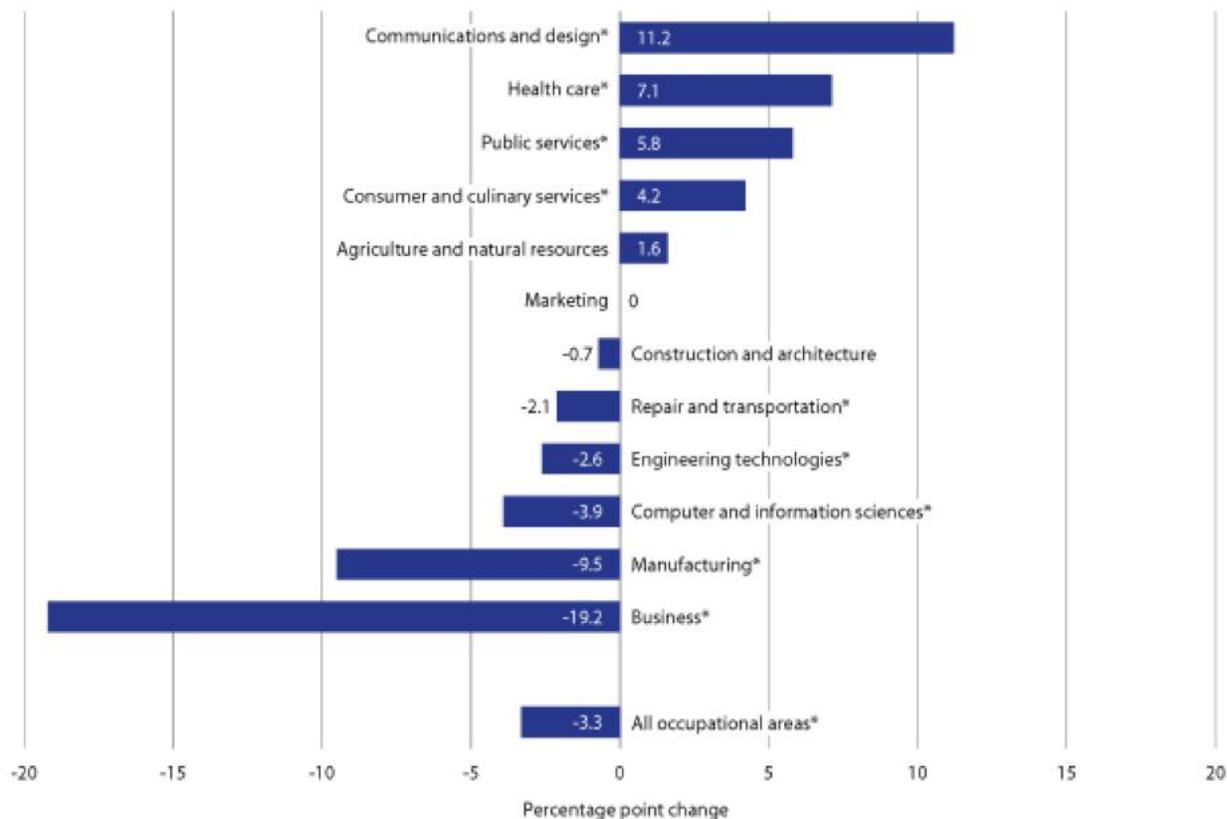


Figure 3. Changes in Student CTE Program Enrollments⁴⁷

What “college and career ready” means, however, is subject to a great deal of variance in interpretation. Achieve Inc. and other educa-

work without the need for remediation.⁴⁸ Other definitions, especially those offered by states, also include a focus on personal qualities (e.g., work ethic), workplace skills (e.g., critical thinking), and technical skills (skills specific to particular occupations).⁴⁹

Thus the means recommended by many advocacy organizations to prepare college ready graduates are: high standards and expectations; rigorous courses aligned with standards; and tests to ensure that students meet those stand-

⁴⁵ http://careertech.org/sites/default/files/2015_State_Policy_Review_Final.pdf

⁴⁶ http://blogs.edweek.org/edweek/high_school_and_beyond/2016/01/state_ed_chiefs_offer_75_million_to_states_for_career_preparation_initiatives.html

⁴⁷ Source: http://nces.ed.gov/surveys/ctes/figures/fig_02.asp

⁴⁸ <http://www.achieve.org/college-and-career-readiness>

⁴⁹ H.J. Holzer, D. Linn, and W. Monthey, *The Promise of High Quality Career and Technical Education: Improving Outcomes for Students, Firms and the Economy*, (New York, NY: The College Board, 2013).

ards. Presumably, career-readiness comes with the same requirements. This was the position expressed by the ACT when they concluded planning for college or careers required comparable levels of readiness in reading and mathematics.⁵⁰ No mention was made of personal qualities or workplace skills.

The evidence contradicts the rhetoric, however. Paul Barton at ETS,⁵¹ Peter Cappelli at the Wharton School,⁵² and other labor market experts argue that being prepared for college is not the same as being prepared for successful transition into the workforce. Indeed, the many simplistic definitions supported by various advocacy groups fail to accommodate the varied nature of the workplace and the different kinds of academic preparation required for successful entry. Put another way, the math skills required for entry into an engineering career pathway are different from those required in a social services career pathway. Still these may be different from those math skills required to function as a citizen in a consumer-driven economy.

Despite the rhetoric around college and career readiness, there is general consensus that equipping all young people with the knowledge and skills to become productive adults is an implicit goal of public education. CTE, with its emphasis on providing the background knowledge and tangible skills crucial to career preparation, is now recognized as opening multiple pathways to reach that goal. Pathways will differ for each student, but all pathways should facilitate the ultimate transition into continued learning beyond high school and into the labor market.

Some of the disparity in understanding college and career readiness originates in the U.S. labor market. One explanation for the nation's "college for all" emphasis is that a college degree has become a proxy for employability or work readiness.⁵³ Believing that the high school diploma no longer signifies meaningful achievement, and lacking a national system of industry credentials, employers rely on college degrees. A more recent report shows this trend is continuing if not growing. Burning Glass' 2014 analysis of on-line job postings concluded that many jobs previously not requiring a college credential now do.⁵⁴ Occupations such as entry level IT desk help, construction supervisor, office administrator are a few examples among many that demonstrate an upskilling trend in today's labor market even when there is no evidence of the need for baccalaureate skills. The authors conclude that the B.A./B.S. requirement provides a proxy for identifying better workers. The authors also conclude that industries with well-defined or strong certification and licensure standards are resisting this trend. What the authors do not acknowledge is the likelihood that employers have the luxury of raising standards in a weak labor market with relatively high un and underemployment.⁵⁵

In the context of growing interest in CTE as part of a college and career ready agenda, a parallel discussion of what constitutes high quality CTE has emerged. The current Perkins IV federal legislation provides a beginning framework for the necessary system to support high quality CTE but it is not sufficient.

⁵⁰ ACT, *Ready for College and Ready for Work: Same or Different*, (Iowa City, IA: ACT, 2006).

⁵¹ P. Barton, *High School Reform and Work: Facing Labor Market Realities*, (Princeton, NJ: Educational Testing Service, 2006).

⁵² P. Cappelli, "Schools of Dreams: More Education is Not an Economic Elixir," *Issues in Science and Technology* 24, no. 4 (2008): 60-64.

⁵³ J.R. Stone III, and C. Alfeld, "The Neglected Majority-revisited," *Journal of Career and Technical Education* 21, (2006): 61-74.

⁵⁴ "How Demand for a Bachelor's Degree is Reshaping the Workforce," *Burning Glass Technologies*, 2014, www.burning-glass.com.

⁵⁵ A. Sasser Modestino, D. Shoag, and J. Balance, *Upskilling: Do Employers Demand Greater Skill When Skilled Workers are Plentiful*, Working paper, (Boston: Federal Reserve Bank of Boston, 2014).

Career and, one could argue, college readiness requires much more than academic skills. To be career ready, a graduate must have mastery of three kinds of skills, not just one. First and most obviously, academic knowledge is important—especially the *occupational expression of academic knowledge*; graduates should know how to use mathematics or science to solve authentic workplace problems, for example. Second, *employability skills*—often called soft skills—apply to all workplaces and include such personal qualities as responsibility, self-management, and integrity. Recently the term “grit” has been popularized as capturing the qualities of persistence in the face of setbacks; a quality necessary for success in work and life (Duckworth, Peterson, Mathews and Kelly, 2007). Third, *technical skills* are unique to specific occupational areas, although for many students, instruction in a specific occupational context offers opportunities to develop all three types of skills.⁵⁶

Programs of Study

The 2006 Perkins IV legislation introduced Programs of Study (POS) to the CTE community. POS are the most recent effort in the United States to improve the transition of youth from high school to the workplace. Unlike most other industrialized nations, the U.S. educational system lacks the formal structures—like apprenticeships—that facilitate this transition. Indeed, the United States has no national system linking education and the workforce but is rather a patchwork of state, federal and private initiatives as discussed earlier. None-the-less, the legislation building on the history of Tech Prep, School-to-Work, and Youth Apprenticeship required the following:

- Secondary and postsecondary elements.
- Technical content that is aligned with academic standards and offered in a coherent, coordinated and non-duplicative progression that begins in secondary on leading seamlessly into post-secondary education where students engage in more advanced learning and acquire more advanced industry credentials.
- Rather than just a collection of courses, the focus in POS should be on obtaining industry-recognized credentials. Such credentials may be short-term (like an AWS welding certification or NIMS certifications) or longer term, such as a two-year RN or applied associates degree in advanced manufacturing. Other credentials may require degrees from professional schools in colleges and universities. Acquisition of credentials can begin in high school with more advanced credentials offered in the post-secondary setting. Ideally, these credentials would be stackable, that is: each would articulate into the next to facilitate student development over time as the workplace and personal circumstance might require.
- The opportunity for obtaining postsecondary education credits through dual or concurrent credit is encouraged. The use of dual credits has grown over the past decade and graduating high school with a college transcript as well is a terrific motivator to continue education beyond high school. However, most dual credit offered is for academic, not technical courses (NCES, 2013).

The most exhaustive and current research on POS has been conducted by the NRCCTE. Multiple studies on POS may be found at www.nrccte.org. The most recent longitudinal

⁵⁶ J.R. Stone III, and M. Lewis, *College and Career Ready for the 21st Century: Making High School Matter*, (New York: Teacher’s College Press, 2012).

study found that POS students (Castellano, et al, 2014):

- outperformed their peers on the number of credits they earned in STEM and AP classes
- while also earning higher GPAs in their CTE classes

POS research conducted by the NRCCTE has shown the need for (and benefits of) career guidance and counseling to be quite clear. Developing a career identity and building a career pathway is a process that should begin no later than middle school. Unfortunately, not enough attention is paid to assisting young people in engaging in thoughtful, thorough career development. One of the issues facing schools is that students are often confronted with career and life decisions with limited opportunities for career exploration. Too often, students are offered few opportunities to engage in career exploration and given little useful information on postsecondary options (Dykeman, et al., 2003). The result is that career development is often a by-product of the educational curriculum, with a “figure it out as you go along” mentality prevalent among educators and students regarding career exploration. An effective, high quality CTE system would address this.

A successful CTE system that serves the needs of many, if not all students, requires supportive state policy and a well-articulated system. Such a system must bring together key institutions in effective partnerships grounded in extensive and intensive career development staffed by knowledgeable and effective educators who teach a world-class technical curriculum. If we assume the Common Core State Standards or state equivalents will continue to shape the traditional core academic subjects, what is the role of career and technical education curriculum in preparing youth for careers and continued learning beyond high school?

Relevant Programs in CTE

The curriculum for a high quality CTE program ought naturally to begin with the career pathway and the knowledge and skill demands required for successful entry into and advancement within that pathway. The framework for identifying the requisite knowledge and skills may be thought of as career readiness. This is a part of the larger discussion of college and career readiness that has come to dominate public discourse around the purposes of public education. In applying this larger framework to the question of creating world-class curricula, three kinds of knowledge and skills emerge that ought to be the foundation of occupationally oriented programs described earlier: occupational expression of academics, occupational or generalizable employability skills, and technical skills.⁵⁷ Each domain of knowledge and skills must be part of a high quality CTE program.

To build on this basic framework, CTE programs should access state or regional labor market data and economic analyses and then use joint (HS and CC) technical advisory committees to further refine programs to ensure the curriculum is aligned with real world labor market opportunities for graduates for existing and emerging occupations. Similarly, related academics should be integrated in the program framework.

Effective pedagogy in CTE

Secondary CTE is more than a job-training program. While it is important to align the curriculum with industry practices, it is equally important to align the pedagogy with sound learning theory focused on meeting student needs as

⁵⁷ J.R. Stone III, and M. Lewis, *College and Career Ready for the 21st Century: Making High School Matter*, (New York: Teacher's College Press, 2012).

well. High-quality CTE should employ three pedagogical strategies: classroom instruction, work-based learning, and career-technical student organizations.

In the classroom, CTE teachers should emphasize *contextual learning* in addition to technical skills in which students learn how to apply academic content in a real world context (for instance, learning how electricians use algebra to solve job-related problems), in the classroom. According to a report published in 2010 by the National Research Center for Career and Technical Education (NRCCTE) Curriculum Integration Workgroup, the integration of curriculum in CTE should support the understanding of academic *and* technical content. As the authors note, *rigor resides in combining CTE and academic skills as applied to real-world problems*.⁵⁸ Students who learn mathematics in this way—exploring fractions with tape measures while constructing a building, calculating the volume of a cylinder while repairing an automobile, estimating the surface area of parts of the human body during EMT training—routinely do better on standardized math tests than other students.⁵⁹ Embedding integrated curricula in project based learning appears to be a promising extension of this approach.

Beyond the classroom, quality CTE programs must actively involve employers in the training and education of youth (work-based learning or WBL). Our counterparts in Europe have long understood the value of WBL in the education of youth. The Organization for Economic Cooperation and Development (OECD, 2010) conducted an extensive analysis of voca-

tional education and training (VET: the European equivalent of CTE) in its member countries. The cross-country synthesis of these studies showed that WBL-intensive approaches are especially effective in meeting the developmental needs of youth and in preparing them for advanced studies in polytechnics and applied science university programs. The United States is an outlier amongst the industrialized nations in how few of its youth are afforded the opportunity to engage in meaningful WBL.

WBL has the potential to build the kinds of skills and behaviors that research has increasingly shown are critical to success in many fields of human endeavor including the workplace and college: environments that are not easily replicated in the classroom. It is quite clear that learning within a community of professional practice provides students unparalleled opportunities to learn adult behaviors necessary to prosper in today's workplace, colleges, and communities: as observed in the Harvard University *Pathways to Prosperity* report which described WBL as a necessary part of preparing youth for successful adulthood.⁶⁰

Almost all successful CTE programs have an active student organization. Career and Technical Student Organizations (CTSOs) are co-curricular with some activities taking place during regular classes and others outside of school hours. Because of their integration of rigorous academic and technical content and focus on preparation for a career, CTSOs complement many elements of the Programs of Study required under the 2006 reauthorization of the Perkins IV legislation and lead to positive academic and career development outcomes.

Students learn skills related to specific occupations and develop their technical literacy

⁵⁸ D. Pearson, J. Sawyer, T. Park, L. Santamaria, E. van der Mandele, B. Keene, and M. Taylor, *Capitalizing on Context: Curriculum Integration in Career and Technical Education* (Louisville, KY: The National Center for Research in Career and Technical Education, 2010).

⁵⁹ J.R. Stone III, C. Alfeld, and D. Pearson, "Rigor and Relevance: Testing a Model of Enhanced Math Learning in Career and Technical Education," *American Education Research Journal* 45, no 3. (2008): 767-795.

⁶⁰ W.C. Symonds, R.B. Schwartz, and R. Ferguson, *Pathways to Prosperity: Meeting the Challenge of Preparing Young Americans for the 21st century*. (Cambridge, MA: Harvard Graduate School of Education, 2011).

through exposure to the general concepts of their chosen field. A national study by the NRCCTE found that in comparison to comparable students not enrolled in CTISOs, CTISO participants reported higher academic motivation, academic engagement, career self-efficacy, and college aspirations. Some of the positive experiences identified by CTISO members include teamwork, decision-making, competition, leadership, community awareness, career awareness, and personal and social development.⁶¹

The impact of CTE in helping high school students achieve high school outcomes (i.e., graduation, test scores) has been examined through multiple studies in the past decades. One of the most consistent findings is the holding power of CTE. That is: CTE students in numerous studies were more likely to graduate from high school than were students to which they were compared (as seen in Dougherty;⁶² Plank, et al;⁶³ and Stone & Aliaga⁶⁴). Some studies have found a positive effect of CTE on enrollment in postsecondary education⁶⁵ while others find mixed effects, especially those

which control for student characteristics.⁶⁶ One can conclude that concentrating in CTE does no harm in terms of academic achievement and postsecondary participation.

Finally, there have been a number of studies examining the economic impact of CTE participation in high school. The most rigorous study was conducted by the Manpower Development Research Corporation and found substantial wage advantages to students who participated in career academies in high school.⁶⁷ Jacoby (2013) summarized numerous studies and found consistent positive labor market returns to CTE participation. While these varied depending on the field of study (i.e. computer related vs. hospitality), the overall results were positive. Carnevale, Rose and Hanson (2012) found that sub-baccalaureate credentials were more valuable in the labor market than many baccalaureate degrees.

What these data suggest is that CTE engages youth and increases the likelihood they will complete high school. There is evidence that some forms of CTE enhance students' academic performance. There is abundant evidence that CTE provides participants an advantage in the labor market of today.

Like any educational program there is variability in the quality of what the students experience. The challenge is to imagine and then create a CTE that is consistently high quality regardless of where it is offered.

CTE Tomorrow

⁶⁶ D. Stern, *Pathways or Pipelines: Keeping High School Students' Future Options Open While Developing Technical Skills and Knowledge*, (Background paper for the National Academy of Science Committee on The Supply Chain for Middle-Skill Jobs: Education, Training, and Certification Pathways, 2015).

http://sites.nationalacademies.org/cs/groups/pgasite/documents/webpage/pga_167702.pdf

⁶⁷ J.J. Kemple, and J. Willner, *Career Academies: Long-term Impacts on Labor Market Outcomes, Educational Attainment, and Transitions to Adulthood*, (New York: MDRC, 2008).

⁶¹ C. Alfeld, D. M. Hansen, S. R. Aragon, and J. R. Stone III, "Inside the Black Box: Exploring the Value Added by Career and Technical Student Organizations to Students' High School Experience," *Career and Technical Education Research* 31, no. 3 (2006): 121-155.

⁶² S.M. Dougherty, *The Effect of Career and Technical Education on Human Capital Accumulation: Causal Evidence from Massachusetts*, (Storrs, CT: Neag School of Education, University of Connecticut, 2015).

⁶³ S. Plank, S. DeLuca, and A. Estacion, *Dropping out of High School and the Place of Career and Technical Education: A Survival Analysis of Surviving High School*, (St. Paul, MN: National Research Center for Career and Technical Education, 2005).

⁶⁴ J. R. Stone III, and O.A. Aliaga, "Career and Technical Education and School-to-work at the End of the 20th Century: Participation and Outcomes" *School to Work in the United States*, ed. D. Neumark, (New York: Russell Sage Foundation, 2007).

⁶⁵ Dougherty, *The Effect*.

Career and technical education is and has been the part of the American high school that provides the link between the needs of the labor market and the needs of young people to be fully prepared to move into the workforce or continue their career-focused education and training beyond high school, to become a productive adult. Concerns regarding how to strengthen our economy, as well as complaints from employers that too many students graduate from college without the knowledge and skills needed to fill jobs, have sparked a renewed interest in CTE.

A general consensus is emerging that equipping all young people with the knowledge and skills to become productive adults is or should be one of the goals of public education. CTE, with its emphasis on providing the background knowledge and tangible skills crucial to career preparation, is now recognized as opening multiple pathways to reach that goal. The future of CTE lies in providing the occupational component to the emergent movement to career pathways.

In 2012, the secretaries of the U.S. Departments of Education, Health and Human Services, and Labor signed a joint letter committing to the use of career pathways as a strategy to help youth and adults acquire marketable skills and industry recognized credentials. The means for this would be alignment between and among education, workforce development, human and social services and other state agencies that provide workforce preparation. The alignment includes aligning state resources with the intent of creating integrated service delivery combining federal and state funding streams.⁶⁸

This is a new way of thinking for secondary CTE. The vision embedded in this letter and subsequent documents is of a comprehensive, cross-agency approach to building a system that

aligns education, workforce and supportive services to guide a wide range of individuals—youth and adults—to move successfully through the continuum of education and training programs that ultimately lead to credential attainment and family-supporting careers. In this vision, high quality CTE described earlier is but one component. The CTE of the future will be part of a larger system that shares with other education and training programs a common direction linked to a state or region's economic strategy.

Imagine a system where a student interested in health care begins a career pathway in 10th grade. In this system, the student would begin to study the same technical content as a person who is not a high school student but has the same career goal. The high school student would begin a process of taking courses and acquiring industry recognized credentials (e.g., Medical Assistant, EMT, STNA/CNA) in his high school career that lead directly into postsecondary education where he continues to stack credentials as a Phlebotomy Technician or LPN which can lead further to an RN; an RN in turn can be articulated into a BSN. An adult can pursue the same pathway with courses offered through adult education or the local community college. Some of these courses may be taken at the local college or other education provider through a dual credit arrangement. Some of these educational experiences may occur in the community, in enterprises.

The key is that the curriculum and the credentials are the same because all providers are guided by the same conceptual framework and the same industry standards. For the high school student, the credentials are embedded in high quality CTE programs that ensure the student will graduate with the necessary skills to continue formal learning beyond high school. One can imagine a similar program in manufacturing built around certifications provided by the National Institute of Metalworking Skills (NIMS) leading to a career pathway built on

⁶⁸ <http://www2.ed.gov/about/offices/list/ovae/ten-attachment.pdf>

stackable credentials providing opportunities in advanced manufacturing and ultimately manufacturing management. Such a system does not perpetuate the false dichotomy between types of learning that plagued the latter part of the 20th century.

This vision requires the CTE of the future to be an integral part of the high school experience of many if not most students, students who aspire to careers in health care, law and government, STEM, manufacturing, marketing, education or the thousands of other opportunities, the education for which can begin in high school. This vision offers an integrated educational experience for all students that addresses their academic, social and career development needs. Such a Deweyan vision would ensure

young people have a solid beginning on the pathway to becoming their future selves.

*Dr. James Stone is a native of Washington D.C. He earned his B.S. and Ed. D. degrees at Virginia Polytechnic Institute and State University and a Master's in School Administration at George Mason University. Stone has held faculty positions at the University of Wisconsin-Madison, the University of Minnesota (Professor Emeritus) and Professor and Distinguished University Scholar in the College of Education and Human Development at the University of Louisville. Stone has served as director of the National Research Center for Career and Technical Education (NRCCTE) since 2002 which is now part of the Southern Regional Education Board (SREB). He has authored or co-authored more than 100 reports of research, journal articles, or books. His most recent book is entitled, *College and Career Ready in the 21st Century: Making High School Matter* (Teacher's College Press, 2012).*