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Center for **Public Education**

Career and Technical Education:
Building New Pathways into the Labor Market

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INTRODUCTION

Survey after survey shows Americans are split about the very purpose of education. According to the 2016 PDK Poll of the Public's Attitudes Toward Public Schools, 45 percent of respondents felt the main goal of school is to prepare students academically, while about a quarter each said that preparing students to be good citizens and workers was the main goal.

But when forced to choose, three times as many respondents (68 percent) said they'd like to see schools offer more career-technical or skills-based coursework than honors or advanced academic classes (21 percent). Fortunately, schools don't have to choose.

Career and Technical Education (CTE) balances the pull between the practical and theoretical by applying academic knowledge to real-world problems, preparing students for a wide array of careers. Unfortunately, confusion and stereotypes still reign when it comes to what career and technical education is and isn't, even as public sentiment shifts to expand these educational opportunities and Congress considers legislation and funding to do just that.

These inherent contradictions around an issue that seems to enjoy broad support are among the reasons the Center for Public Education wanted to produce this FAQ guide.

In the following pages, we provide a brief overview of the history and purpose of career technical education, how it is funded and operationalized at various levels and ultimately the outcomes for students who have participated in CTE programs. And, as always, we conclude with questions for policy makers to help guide them in implementing or expanding their own CTE offerings.

1. WHAT IS CTE?

The origin of vocational education in the United States is rooted in the Smith-Hughes Act of 1917. The purpose of the legislation was to better position the U.S. in the newly industrialized global economy and was a response to the growing number of unemployed youth in cities. The law was designed to prepare students for work in agriculture, manufacturing, and home economics. Unfortunately, it was often criticized for tracking low-income and minority students into low-paying jobs (Visher & Stern, 2015). While the federal legislation overseeing these programs changed its name to the Vocational Education Act in 1963, this model remained virtually unchanged for decades.

The 1983 release of the seminal *A Nation at Risk* altered the education landscape and generated a movement for all students to be more academically competitive, even those intending to go directly into the workforce. Named after the Kentucky Congressman who pushed through major social legislation such as Headstart, child nutrition and federal aid to college students in his role as the chair of the Committee of Education and Labor, the Carl D. Perkins Vocational Education Act of 1984 solidified an increasing integration between vocational and academic skills (Aliaga, Kotamraju, & Stone, 2012). Each successive reauthorization made these linkages stronger, with the latest iteration of the law in 2006 also ushering in a new name, the Carl D. Perkins Career and Technical Education Act.

The House of Representatives proposed and passed the law's reauthorization, the Strengthening Career and Technical Education for the 21st Century Act in July 2016, where it has remained.

| Vocational Education was:	Career Technical Education is:
• Basic academics with technical skills related to specific jobs	• High-level academics with technical training to enter jobs or college
• Primarily for non-college goers	• For anyone interested in field
• Based on assumption individuals will always work in same occupation	• Preparation for a changing workplace, including the ability to change careers
• Often used to track some students into job training and away from college	• Again – for anyone interested in field, college and non-college goers alike

2. WHO ENROLLS IN CTE?

Today's CTE is not just for non-college goers. As of 2009, 94 percent of high school students completed at least 0.5 credits in a CTE course. However, only 85 percent of high school students completed a CTE course in an occupational field; the nine-point difference is due to students who participated in non-occupational courses such as typing, career preparation and family/consumer sciences (NCES, 2009).

As CPE discovered in its original research series, The Path Least Taken, students gain the greatest benefit from CTE programs when they take at least three courses in a particular field; 19 percent of students had such a concentration (NCES, 2009).

CTE is somewhat equally distributed across demographic groups, though males are slightly overrepresented among CTE course-takers (NCES, 2014).

CTE Course-Takers by Gender and Race

■ % of Population   ■ % of CTE Enrollees
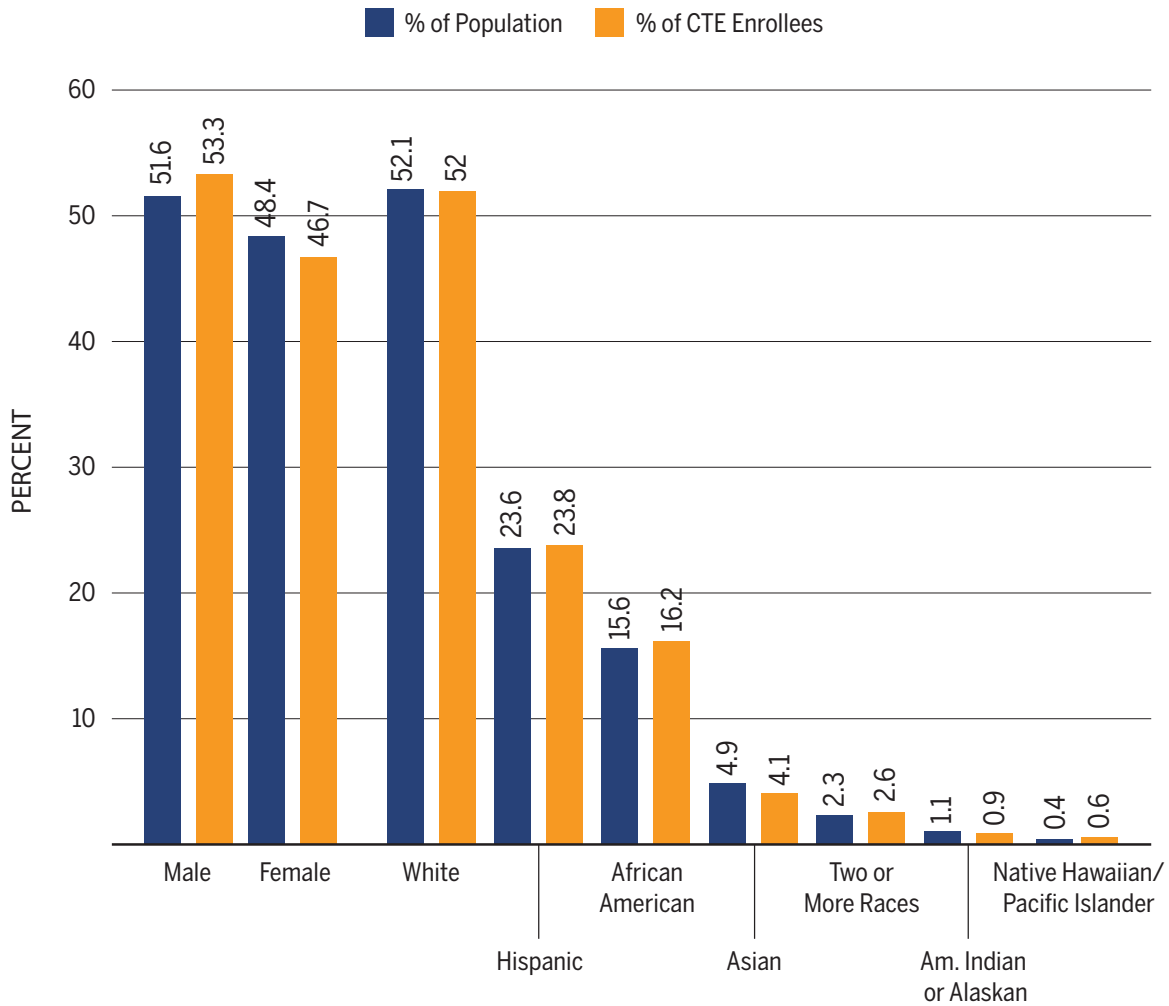
Data Source: Snyder, T. D., de Brey, C., & Dillow, S. A. (2016). *Digest of education statistics 2014* (NCES 2016-006). *National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education*. Washington, DC.; U.S. Department of Education, Office of Career, Technical, and Adult Education. (n.d.) Consolidated Annual Report (CAR). Accessed September 1, 2016 from https://perkins.ed.gov/pims/DataExplorer/CTEParticipant.

Source: Dougherty, S. (April 2016). Career & Technical Education in High School: Does it Improve Student Outcomes? *Fordham Institute*. Accessed 6 September, 2016 from https://edexcellence.net/publications/career-and-technical-education-in-high-school-does-it-improve-student-outcomes.

   Even though most students enroll in at least one CTE course, they are taking fewer courses than they used to. The average number of CTE credits that students earn has decreased approximately 10 percent over the last 11 years, despite high school students earning more credits overall (U.S. Dept. of Education, 2016). This may be due to higher requirements for academic courses, which have seen increased enrollment during the same timeframe.

Note: Race categories exclude persons of Hispanic ethnicity. Estimates include ninth-graders who dropped out or did not obtain a high school credential by 2013.

Average High School CTE Credits Earned By Class of 2013
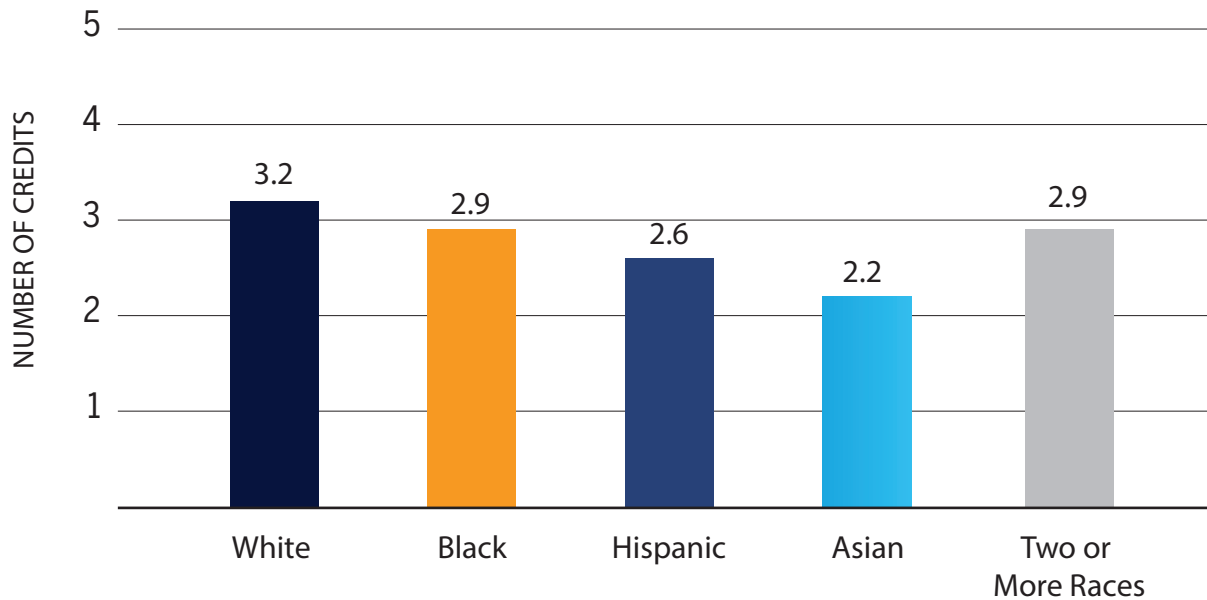
Source: U.S. Department of Education, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09), First Follow-up and High School Transcript Study Public-Use File

Source: National Center for Education Statistics. (2016). Indicator 12: High School Coursetaking. Accessed 7 September, 2016 from http://nces.ed.gov/programs/raceindicators/indicator_rcd.asp
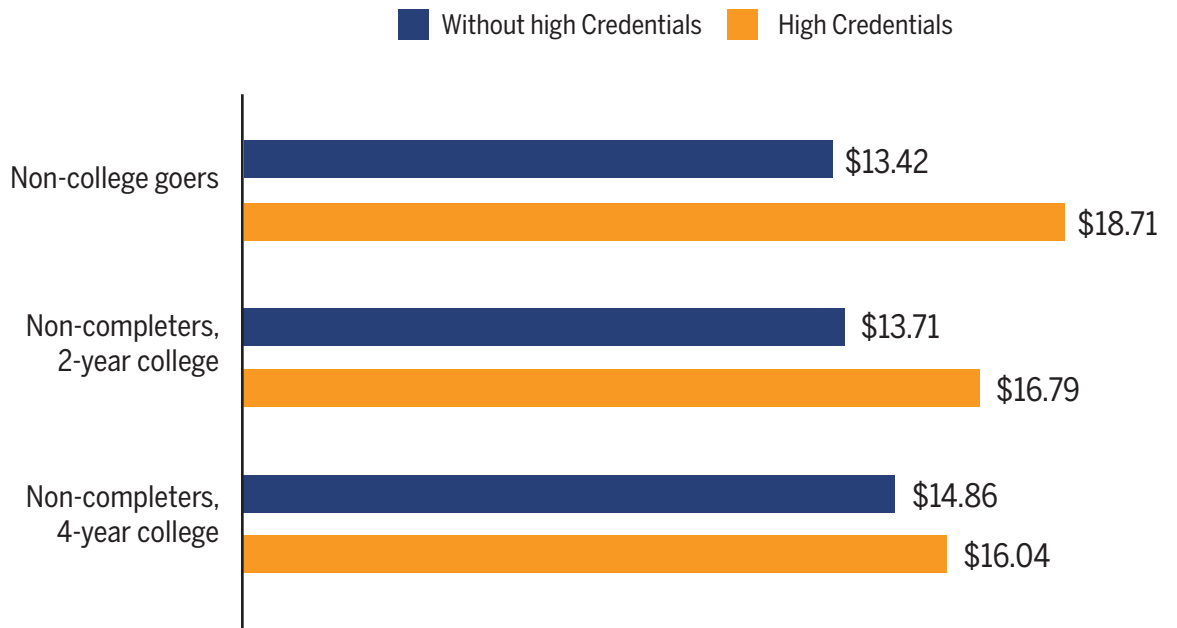
3. WHAT ARE THE OUTCOMES FOR CTE PARTICIPANTS?

All 50 states reported higher graduation rates for students who take a concentration of CTE courses than those who don't (U.S. Dept. of Education, 2016). A recent study in Arkansas found that CTE concentrators (students who took three or more courses as part of a coordinated program of study) were 21 percent more likely to graduate high school than non-concentrators, when comparing students with similar demographic characteristics (Dougherty, 2016). The effect was even more pronounced for males and low-income students at 23 percent and 25 percent, respectively.

Nearly 14 million people, or 70 percent of college-age students, work while enrolled in some form of postsecondary education or training (Carnevale, et al., 2015). CTE programs provide the opportunity for these students to work in positions that may require more expertise, and thus result in higher wages.

While the vast majority of high school graduates do go on to college, some don't, which was the focus of CPE's "Path Least Taken" series. One of the major findings of that original analysis of Class of 2004 graduates was the outsized impact CTE coursework had on the future outcomes of these non-college goers. High school graduates who took a concentration of CTE coursework and high-level math and science classes and who earned at least average grades and a certificate or license in their occupational field achieved comparable, if not better, employment and social outcomes than the average college goer (Hull, et al., 2016).

Hourly Wage of College Goers Without a Degree (at age 26)

■ Without high Credentials   ■ High Credentials

Non-college goers
$13.42
$18.71

Non-completers, 2-year college
$13.71
$16.79

Non-completers, 4-year college
$14.86
$16.04

Source: Hull, J., Belton, J., Campbell, P., and Dillon, N. (2016). The Path Least Taken: A quest to learn more about high school graduates who don't go to college. Center for Public Education. Accessed 6 September, 2016 from http://www.centerforpubliceducation.org/Main-Menu/Staffingstudents.

4. WHAT DOES CTE LOOK LIKE IN STATES/DISTRICTS?

Forty-three states have adopted or modified a set of 16 Career Clusters®, which were developed by the non-profit Advance CTE, known formerly as the National Association of State Directors of Career Technical Education Consortium, which represents state leaders who oversee secondary, post-secondary and adult CTE programs. The seven other states (California, Delaware, Hawaii, New York, Pennsylvania, Utah, and West Virginia) have created their own set of career paths to meet their own market needs, while often producing guides to how they align with the Advance CTE Career Clusters®.

Each cluster contains additional pathways, or specializations, as noted. Career pathways stemming from these topics may vary in the level of further education needed. For example, a Health Science pathway could be the start of a career for a student as a home health aide or a surgeon.

In addition to learning a particular skill, students may also earn credits toward industry credentials (such as a certificate, certification, or license) or an associate's degree. This is considered dual-credit, as the student is also earning high school credit. Some courses may also fulfill academic requirements. For instance, Food Science, offered in Texas under the "Hospitality and Tourism" cluster, counts as a science credit toward high school

Career Clusters

Agriculture, Food & Natural Resources	Architecture & Construction	Arts, A/V Technology, & Communications
• Agribusiness Systems • Animal Systems • Environmental Service Systems • Food Products & Processing Systems • Natural Resources Systems • Plant Systems • Power, Structural & Technical Systems	• Construction • Design/ Pre-Construction • Maintenance/ Operations	• A/V Technology & Film • Journalism & Broadcasting • Performing Arts • Printing Technology • Telecommunications • Visual Arts
Business Management & Administration	**Education & Training**	**Finance**
• Administrative Support • Business Information Management • General Management • Human Resources Management • Operations Management	• Administration & Administrative Support • Professional Support Services • Teaching/ Training	• Accounting • Banking Services • Business Finance • Insurance • Securities & Investments
Government & Public Administration	**Health Science**	**Hospitality & Tourism**
• Foreign Service • Governance • National Security • Planning • Public Management & Administration • Regulation • Revenue & Taxation	• Biotechnology Research & Development • Diagnostic Services • Health Information • Support Services • Therapeutic Services	• Lodging • Recreation, Amusements & Attractions • Restaurants & Food/ Beverage Services • Travel & Tourism
Human Services	**Information Technology**	**Law, Public Safety, Corrections & Security**
• Consumer Services • Counseling & Mental Health Services • Early Childhood Development & Services • Family & Community Services • Personal Care Services	• Information Support & Services • Network Systems • Programming & Software Development • Web & Digital Communications	• Correction Services • Emergency & Fire Management Services • Law Enforcement Services • Legal Services • Security & Protective Services

Manufacturing	Marketing	Science, Technology, Engineering & Mathematics
• Health, Safety & Environmental Assurance • Logistics & Inventory Control • Maintenance, Installation & Repair • Manufacturing Production Process Development • Production • Quality Assurance	• Marketing Communications • Marketing Management • Marketing Research • Merchandising • Professional Sales	• Engineering & Technology • Science & Mathematics

Transportation, Distribution & Logistics
• Facility & Mobile Equipment Maintenance • Health, Safety & Environmental Management • Logistics Planning & Management Services • Sales & Service • Transportation Operations • Transportation Systems/ Infrastructure Planning, Management & Regulation • Warehousing & Distribution Center Operations

Source: Adapted from Advance CTE. (n.d.). Career Clusters. Accessed 14 December, 2016 from
https://careertech.org/career-clusters.

graduation requirements (biology and chemistry are prerequisites for this course, so Food Science would not take the place of those traditional "academic" courses).

CTE classes are typically offered at high schools, but may also be taken at a local community or tech college or a specialized career and technical center that may serve students from several schools or districts.

Below are snapshots of how two different districts implemented CTE programs in their school community.

Career Academies in Nashville

Metropolitan Nashville Public Schools (MNPS) was struggling. In 2005, the district's graduation rate was only 62 percent. However, MNPS received a federal grant the following year to transform eight high schools into career academies. The program slowly expanded and now includes all 12 high schools, which encompass 42 career academies. By 2014, the graduation rate had climbed to 79 percent. MNPS's demographics have also shifted over time, from 55 percent of students being low-income in 2005 to 73 percent in 2014; the English Language Learner (ELL) population has increased by nine percentage points in the same time period, from six to 15 percent. MNPS is a diverse district; of its 88,000 students, 45 percent are African-American, 20 percent are Hispanic, 31 percent are white, and the remaining four percent are of other races (Nashville Area Chamber of Commerce, 2014).

MNPS' career academy program utilizes the following components to assist students in choosing and learning about careers:

- 9th grade: Career Exploration Fair & College Visit
- 10th grade: Industry-Related Field Trip
- 11th grade: Job Shadow
- 12th grade: Internship & Capstone Experience (research paper, project, portfolio, and presentation)

Students still complete academic coursework, but in the context of their academy's theme. One example is the Academy of Environmental and Urban Planning, which partners with local architecture firms and non-profits. Students can become certified in AutoCAD, a drafting and design software that is the starting point for an engineering career. Mentors from the field are available to talk to students about careers and give them work-place learning opportunities (Metropolitan Nashville Public Schools, n.d.).

The program is supported by the Nashville Chamber of Commerce, along with 278 companies and non-profit organizations. The PENCIL Foundation helps facilitate partnerships between businesses and schools.

Community Partnerships Offer Support in Denton, TX

The Denton Independent School District (DISD) is a suburban district north of Dallas that serves 26,000 students, of whom 42 percent are low-income and 15 percent are ELLs. A little over half of the students are white, 30 percent are Hispanic and 12 percent are African-American (Texas Education Agency, 2015). DISD is home to an advanced CTE program that is strongly supported by the district, school board, and the community. In 2006, they opened the LaGrone Advanced Technology Complex (ATC) — a large, modern building which provides programs such as aircraft and automotive technology. The ATC has some integrated academics, but most students spend half the day at their home schools and half the day at the center for their CTE coursework. In 2015, 25 percent of DISD's secondary students were enrolled in a CTE program at the ATC (Denton ISD, n.d.). About 1 in 10 high school students earned a certificate or licensure. Additionally, the ATC contracts with several other smaller districts in the surrounding areas.

DISD's CTE Department also hosts annual career fairs for elementary and middle schools and runs summer camps for local children (Denton ISD, n.d.). Career counselors in each of the district's four high schools help to educate each school's general counselors on the programs CTE offers and how to best support students in achieving their career goals.

Support for the CTE program hasn't always been strong. Denton struggled with a negative image of CTE. CTE leaders involved the press, spent a lot of time talking to community members about their programs' potential, and built partnerships with local businesses, resulting in increased numbers of students participating in CTE and earning certifications.

5. WHICH CTE PROGRAMS ARE MOST POPULAR?

Among students who concentrate, the most popular programs in 2012-2013 were business, arts, audio-visual technology and communication, and health science. Distinctions can be made between students who take a course in a subject, such as business, but have much lower rates of concentration.

High School CTE Participation, 2008-2009
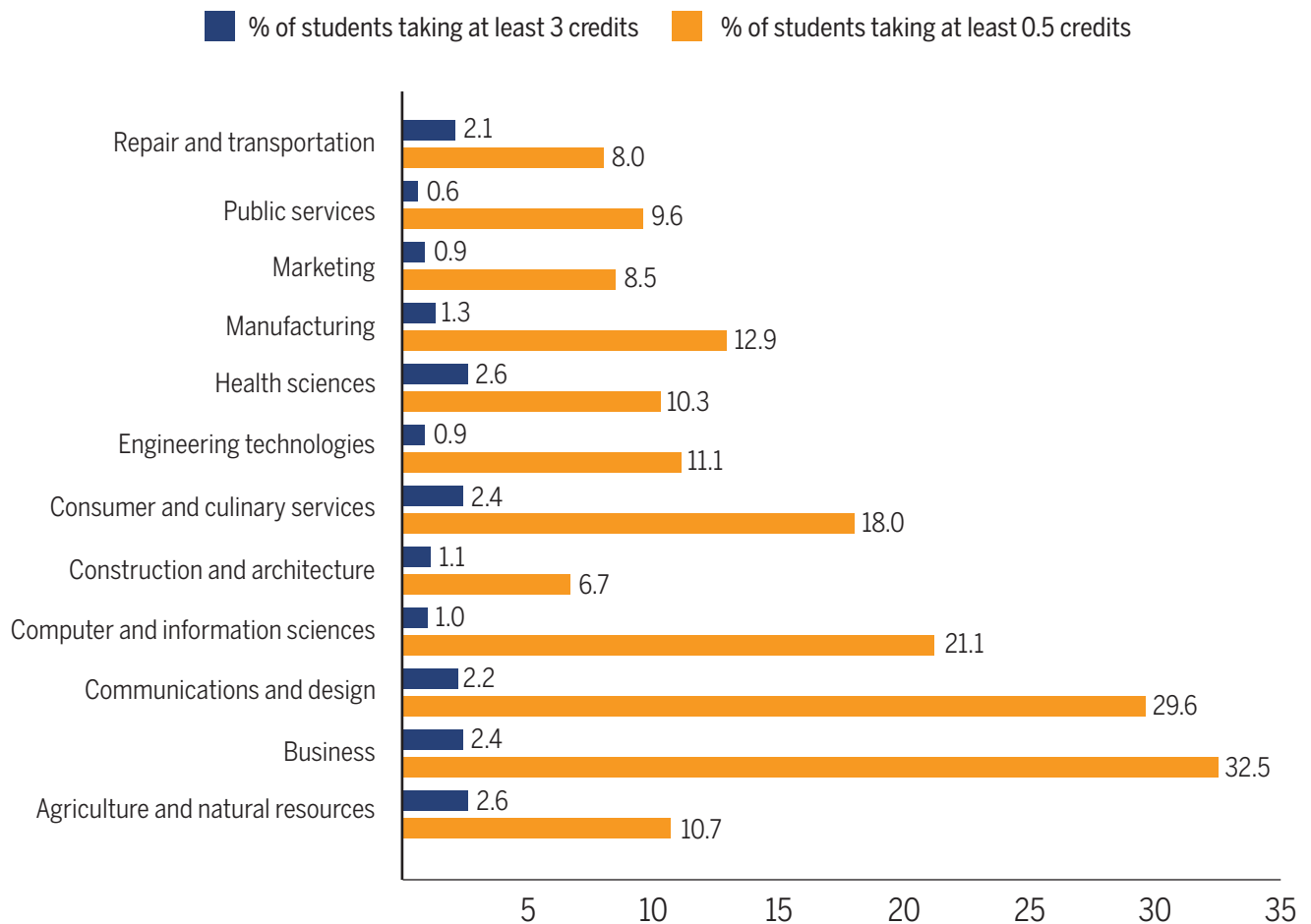
■ % of students taking at least 3 credits   ■ % of students taking at least 0.5 credits

Program	% at least 3 credits	% at least 0.5 credits
Repair and transportation	2.1	8.0
Public services	0.6	9.6
Marketing	0.9	8.5
Manufacturing	1.3	12.9
Health sciences	2.6	10.3
Engineering technologies	0.9	11.1
Consumer and culinary services	2.4	18.0
Construction and architecture	1.1	6.7
Computer and information sciences	1.0	21.1
Communications and design	2.2	29.6
Business	2.4	32.5
Agriculture and natural resources	2.6	10.7

Data source: National Center for Education Statistics. (2009). Secondary/High School Level Tables and Figures. *Career/Technical Education Statistics*. Accessed 6 September, 2016 from https://nces.ed.gov/surveys/ctes/tables/h123.asp. Categories of concentration are different than in more recent data sets.

While males and females have similar rates of enrollment in CTE, the percentage of students who concentrate in a particular field varies significantly based on gender. Males represent more of the students enrolled in architecture, information technology, manufacturing, STEM fields (science, technology, engineering, and math), and transportation, while females have higher participation rates in education, health, and human services.

Concentrators, by Gender, 2013-2014
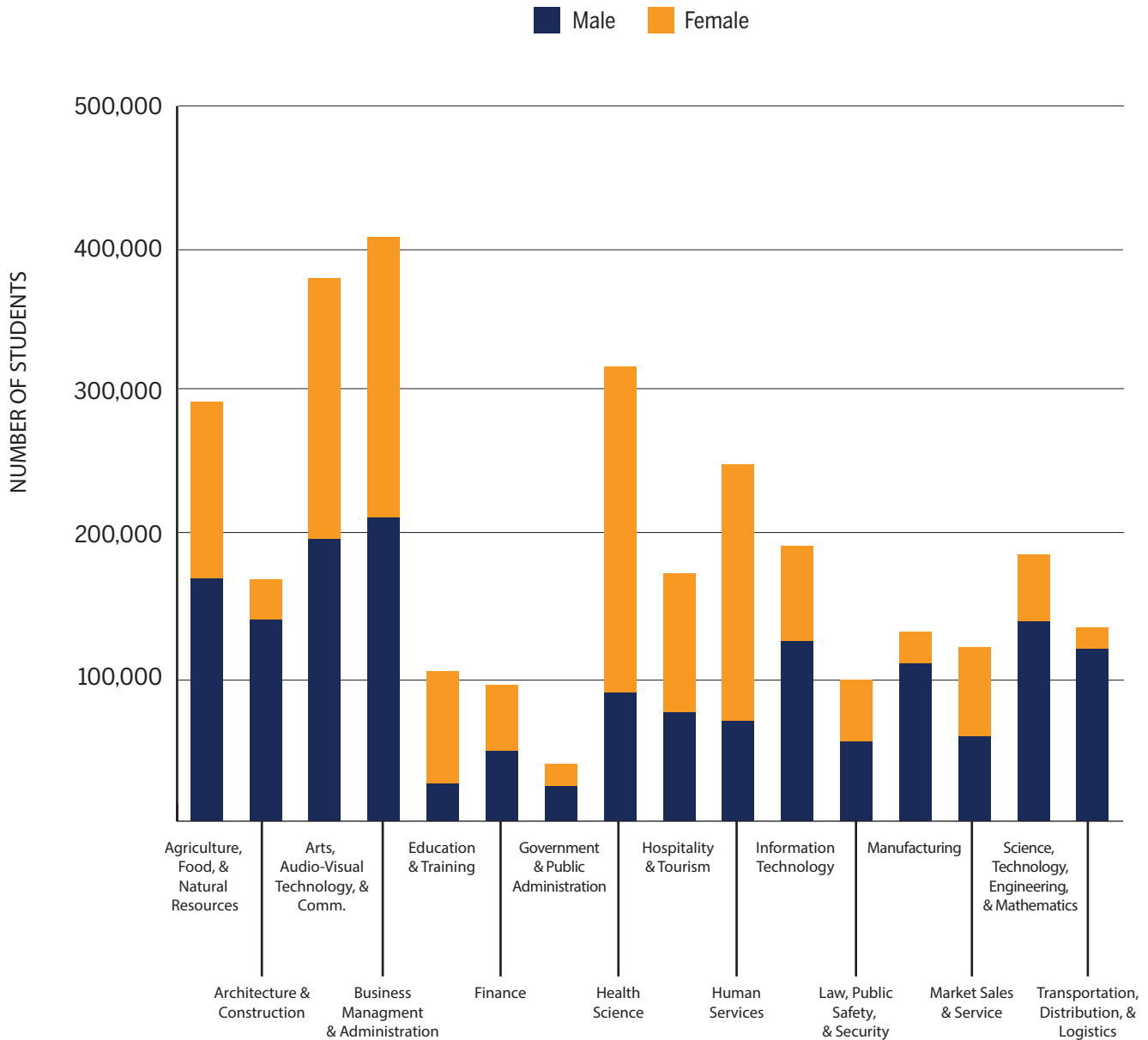
Data source: U.S. Department of Education, Office of Career, Technical, and Adult Education, Consolidated Annual Report (CAR) for 2013-2014. Accessed September 1, 2016 from https://perkins.ed.gov/pims/DataExplorer/CTEConcentrator. The definition of "concentrator" varies by state and may vary from the previous table based on differences in definition, as well as year of data.

6. HOW IS CTE FUNDED?

CTE in secondary schools is typically funded through local and state education dollars, as well as federal funding under the Carl D. Perkins Career and Technical Education Act of 2006 (Perkins IV). Congress allocated $1.1 billion in 2012-2013 under Title I of Perkins IV, which states then siphon to various educational institutions (U.S. Dept. of Education, 2016). On average, 61 percent of Perkins IV funds go to secondary programs, with the other 39 percent supporting postsecondary programs.

The U.S. House of Representatives approved a bill to reauthorize the Career and Technical Education Act in July 2016, which included $1.133 billion in funding for *Perkins IV* in fiscal year 2017. This amount would gradually increase to $1.213 billion by 2020 under the current proposal. State and local education agencies would have more flexibility under the reauthorized bill to adapt to local market needs with less federal regulation. If a reauthorization is not passed, Perkins IV is expected to receive steady-level funding through a continuing resolution (Advance CTE, ACTE, 2016).

7. WHAT ARE THE CHALLENGES FACING CTE?

Industry partnerships with educational institutions are key to a successful CTE program, as they provide opportunities for students to make real world connections through internships or mentoring, for instance (National Association of State Directors of Career Technical Education Consortium, n.d.). However, a recent survey of CTE educators found that 49 percent of respondents indicated that they were "not satisfied" with their access to industry partners and mentors (Kantrov, 2014).

Many parents and educators still view CTE as being in conflict with academics, though research shows that students who take a concentration of CTE courses are more likely to graduate (U.S. Department of Education, 2016; Dougherty, 2016) and show no significant difference in academic achievement scores or college enrollment. (Dougherty, 2016; NCES, 2009).

Many state education agencies isolate CTE from other academic programs, which may diminish opportunities for enriched curriculum and collaboration across programs.

Personal Opportunity Plans

Personalized Opportunity Plans (POPs) help students set academic and career goals in a supportive school environment that may also assist students in addressing behavioral and health needs. Similar to an Individualized Education Plan (IEP) used in special education, but with greater student input, a POP provides a vehicle through which schools, families, and students can monitor a student's progress toward clear, defined goals. The POP may also help schools identify additional supports that a student may need to be successful, such as mental health services, access to basic necessities, or academic tutoring. For more information on how districts can support students in finding successful career paths through POPs, read *Partnerships not Pushouts*.

Insufficient high school counseling staff can also make it difficult to inform families and students about CTE options and advise them on all available career and college opportunities. The American School Counselors Association recommends a student-counselor ratio of 250:1, but the national average is 491:1 (American School Counselor Association, n.d.).

8. WHAT ARE SOME BEST PRACTICES FOR CTE PROGRAMS?

The MDRC, a research firm, identified 10 best practices for strong career academies, which are a type of CTE program (Visher & Stern, 2015). These practices could also be applied to other CTE models.

1. Pathways keep students' options open. Students don't have to decide on one specific career or whether or not they will attend college at age 15. Having a solid base in a career field teaches them applicable skills and knowledge that can follow them to any path.

2. Pathway choices are up to students and their families. Students may be more motivated to succeed if they are willingly participating in a program.

3. CTE programs offer personal support for students, often in a cohort setting. Many CTE programs operate as smaller programs within a larger school, offering greater opportunities for deeper relationships with their peers and long-term supportive relationships with CTE instructors.

4. Curriculum is integrated across subjects. Interdisciplinary projects are more similar to real-life scenarios and may better engage students in learning. An example of this could be the study of public health, which would include biology, social studies, and writing.

5. Knowledge and skills are applied to real activities and projects. Students apply what they've learned to projects that have relevance in the outside world, which increases motivation and provides students with more applicable skills.

National Intermediary Organizations

Intermediary organizations help schools support CTE programs by providing administrative supports that may be cumbersome for school officials. A few examples are:

Linked Learning is an applied educational approach adopted by many schools in California that "combines college-focused academics, work-based learning and intensive student supports. By centering high school around industry themes, learning becomes relevant. Students graduate with the skills and confidence to succeed in college, career and life." Specific organizations work with schools to implement the framework, including the Center for Powerful Public Schools and ConnectEd (The California Center for College and Career).

The National Academy Foundation (NAF) implements small learning communities, or academies, into existing traditional high schools. NAF provides "STEM infused industry-specific curricula and work-based learning experiences, including internships." They sponsored 716 academies across 36 states in 2015-2016.

High Schools that Work is a school improvement initiative through the Southern Regional Education Board that serves 1,200 sites in 30 states. They provide professional development, technical assistance, and assessments to help schools determine how to improve.

6. Employers provide partnerships and opportunities for work-based learning. This helps schools teach the skills in demand in the local market, while reinforcing the value of classroom learning to students. Students are exposed to an array of professions within their career field.

7. Secondary and post-secondary institutions collaborate. Creating a more efficient, streamlined transition from high school to post-secondary institutions best utilizes students' and the public's resources while graduating students who are well-prepared.

8. Districts build community partnerships, communicate with families, and provide administrative support. Administrators drive connections with the local economy in addition to ensuring that school staff have the resources necessary to be successful.

9. High standards, accountability systems, and data-driven decision-making drive student success. Ensuring that programs are truly preparing students for their career path to the highest level possible is paramount.

10. Strong intermediary organizations support programs. Administrative tasks such as managing business relationships, establishing standards, and providing appropriate professional development to instructors may be cumbersome to school districts. National or local non-profits may better be able to serve as a connecting link.

9. WHAT CAN SCHOOL BOARD MEMBERS DO?

School boards interested in strengthening their CTE programs can begin by asking these questions:

- How many students are concentrating in CTE programs in your school district? Are all student groups involved proportionately?

- What industry partnerships does your district have? Are there market needs that your school district could help meet while providing meaningful career opportunities for your students?

- How do traditional academic departments collaborate with CTE courses? Are students being taught real-life applications of academic content?

- Does your district have standards established for CTE courses to ensure that they are high quality?

- Does your district have training opportunities for CTE and other content teachers to be able to incorporate career skills in the classroom? Do they understand the needs of local industries so that they can prepare students to enter those career fields?

- Does your district have adequate school counselors and career advisors to meet student needs? Are families and students informed about all possible college and career pathways? Do you provide support for students to help them plan for life after high school and make sure they are on track to meet their goals?

- How is your district supporting high school students who may not attend college by encouraging them to pursue CTE coursework, high-level math and science classes, and a certificate or license in an occupational field?

This FAQ was written by Chandi Wagner, research analyst at the Center for Public Education, with contributions from Breanna Holland Higgins, a former CPE intern and George Washington University Ed.D. candidate.

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