SCHOOL + STATE FINANCE PROJECT

# Comparing CT's Career & Technical Education Programs

*Policy Briefing - December 17, 2021*

## Introduction

All 50 states and the District of Columbia offer career and technical education (CTE) programs for secondary students. These programs range from cutting-edge technology in artificial intelligence and computer programming to traditional agricultural and manufacturing programs. This policy briefing provides an overview of CTE programs in Connecticut and peer states, including Maryland, Massachusetts, Minnesota, New Jersey, New York, Pennsylvania, and Rhode Island. The review examines how CTE programs are funded, the types of programs offered, governance of CTE programs in each state, and the enrollment process for CTE programs in each state.

## Program History and Background

It has long been a goal of policymakers to provide students with the skills, training, and experiences needed to succeed after high school and in the economy of the current era. In Connecticut, the General Assembly first authorized vocational-technical training programs for secondary students to learn trades in 1907.[A] Nationally, the widespread adoption of vocational programs followed the adoption of the Smith-Hughes Act of 1917 by Congress, which first authorized federal funding for states' vocational programs.[B]

The goals of career and technical education have changed as America's economy has changed. Historically, vocational education was primarily trade-based training that was designed to prepare students for jobs on farms and in factories, and did not emphasize academic learning with a path for postsecondary education. Around the 1970s, the vocational education approach began to change as employers began requiring workers to not only have technical skills but also academic skills, such as being able to read and write at a postsecondary level. During the 1980s and 1990s, the overall number of secondary students concentrating in vocational education programs decreased by roughly nine percent nationally.[1] Around this time, there was a call for a greater synthesis between vocational and academic programs, a "new vocationalism" that would prepare students for a broader range of careers and connect students with high-growth jobs of the future.[2]

In 1998, the term vocational education was replaced in federal legislation by career and technical education (CTE) to reflect programs that allow students to select a pathway that leads to professional certification or an associate's degree.[3] Current CTE programs in many states include more rigorous academic programs, such as finance and engineering, with career pathways including postsecondary training. In 2012, 42 states

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[A] This law was subsequently repealed in 1915. For the history of vocational education in Connecticut, see: Sullivan, M. (2017). *Research Report: Connecticut Technical High School System* (2017-R-0070). Hartford, CT: Connecticut General Assembly, Office of Legislative Research. Retrieved from https://www.cga.ct.gov/2017/rpt/pdf/2017-R-0070.pdf.

[B] For more history on the origins of federal vocational education, see:
Ogden, W.R. (1990). Vocational Education: A Historical Perspective. *The High School Journal, 73*(4), 245-251.

(including Connecticut) and D.C. adopted common core state standards for CTE programs that promote career advancement in a field and the adoption of 16 career clusters and 79 related CTE pathways.[C]

## Federal Funding for CTE Programs

The federal government provides annual grants to each of the states to support the growth of CTE education and increase student access.[4] In July 2018, Congress reauthorized the federal CTE funding authorization legislation, the Carl D. Perkins Career and Technical Education Act of 2006.[5] The current Act, known as the Strengthening Career and Technical Education for the 21st Century Act, and referred to as Perkins V, took effect on July 1, 2019. Perkins V provides states with a basic grant that is no less than the amount the state received in fiscal year 2018 (known as the foundational grant) with additional funds based on state population and per-capita income. Perkins V requires states to spend at least 85 percent of federal funds on eligible secondary and postsecondary CTE programs. States may allocate up to 15 percent of the grant for state administrative purposes, leadership, nontraditional training set-aside, recruiting special populations, and individuals in state institutions (like correctional facilities).

Perkins V grants are provided directly to a state agency, which then distributes funds to local districts, vocational/technical schools, charter schools, and tribal schools operating vocational programming.[6] Under Perkins V, states must designate an eligible agency for the distribution and oversight of federal CTE programs. Perkins V funds requires states to provide 30 percent of secondary funds to districts based on the number of 5- to 17-year-olds who reside in the district and 70 percent based on the number of 5- to 17 -year-olds in families below the poverty line, as defined by federal education standards (with a minimum grant of at least $15,000). Perkins V defines the types of CTE activities that can receive federal funding and specifies that secondary-level programs have to be aligned with the state's academic standards.[7,8] Perkins V funding is tied to accountability standards for students, similar to other federal education grants.

## State CTE Plans

Perkins V also requires states to develop state plans that include: a summary of workforce development activities to improve CTE in the state; a strategic vision and set of goals for preparing an educated and skilled workforce that meets the skilled workforce needs of employers; information on how the state agency will support the recruitment, preparation, and development of teachers; and strategies the state will use to ensure equal access to CTE programs for students from special populations.[D] The plan's narrative

[C] Advance CTE (formerly the National Association of State Directors of Career Technical Education Consortium) has developed 16 career clusters and related pathways. For more information, and a list of all of the clusters and pathways, see Appendix B.

[D] Special populations are defined as: 1) individuals with disabilities; 2) individuals from economically disadvantaged families, including low-income youth and adults; 3) individuals preparing for non-traditional fields; 4) single parents, including single pregnant women; 5) out-of-workforce individuals; 6) English learners; 7) homeless individuals; 8) youth who are either in, or have added out of, the foster care system; 9) youth who have a parent who is either a member of the armed forces or who is on active duty in the services.

must describe the CTE programs that will be developed at the state level and the process and criteria the state will employ for approving locally developed programs of study or career pathways.[9] Additionally, the plan must feature a summary of state-supported workforce development activities (including education and training) and the degree to which the state's CTE programs and programs of study are aligned with and address the education and skill needs of the employers in the state.

Further, Perkins V state plans must include the ways the state agency will disseminate information about CTE programs of study and career pathways, as well as guidance and advice on CTE programs, to students and parents. The plan must also discuss efforts to coordinate with the state workforce board to support the local development of career pathways, and articulate processes by which career pathways will be developed by local workforce development boards. Perkins V state plans are required to describe how the state will support effective and meaningful collaboration between secondary schools, postsecondary institutions, and employers to provide students with experience in, and understanding of, all aspects of an industry, which may include work-based learning such as internships, mentorships, simulated work environments, and other hands-on or inquiry-based learning activities. The state must also describe how it plans to improve outcomes and reduce performance gaps for CTE concentrators.

States must consult with school leaders, teachers, parents, and students in creating the plans, and hold public hearings to develop recommendations. Specifically, the plan narrative requires states to describe how the plan was developed with stakeholders. The list of mandated stakeholders includes:

- Representatives of CTE programs (at both the secondary and postsecondary levels);
- Charter school staff in states where charter schools exist;
- Community representatives;
- Representatives of the state workforce development board;
- Members and representatives of special populations;
- Business and industry representatives, including representatives of industry and state business partnerships;
- Labor organizations;
- Representatives of agencies serving out-of-school and at-risk youth, homeless children and youth;
- Representatives of Indian Tribes and Tribal organizations located in or providing services in the state; and
- Individuals with disabilities.

Perkins V state plans should also discuss how the state eligible agency (the state agency that receives and oversees the distribution of Perkins V funds) plans to consult with the

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U.S. Department of Education, Office of Career, Technical, and Adult Education. (2018). *The Carl D. Perkins Career and Technical Education Act of 2006, as amended by the Strengthening Career and Technical Education for the 21st Century Act (Perkins V): Guide for the Submission of State Plans*. Washington, DC: Author. Retrieved from https://s3.amazonaws.com/PCRN/docs/1830-0029-Perkins_V_State_Plan_Guide-Expires_4-30-22.pdf.

governor of the state as well as heads of other state agencies with authority for career and technical education programs but that are not the eligible agency with respect to the development of the plan. Starting in 2016, states have had to submit separate workforce development plans under the federal Workforce Innovation and Opportunity Act of 2014.[10] Perkins V allows states to submit a combined state plan under the Workforce Innovation and Opporunity Act to describe a shared state vision for workforce development that also satisfies the statutory requirements of Perkins V.

Additionally, for the first time, states will have to develop comprehensive local needs assessments to evaluate their CTE programs and review them on a 2-year cycle.[E] State agencies do not have to submit performance data (discussed below) until FY 2020 and were allowed to use FY 2019 to gather baseline data. Local Perkins grantees (including local school districts, technical schools, and charter schools receiving funds) were not required to conduct and report on a local needs assessment in FY 2019. However, the U.S. Department of Education highlights that states were welcome to begin implementing Perkins V during the FY 2019 school year. States have two options for the submission of their Perkins V state plans:

1. Submit a 1-year transition plan for FY 2019 covering the first year following enactment of the federal law; then in FY 2020 submit a Perkins V state plan covering four years from FY 2020 to FY 2023; or
2. Submit a Perkins V state plan for five years, including FY 2019 as a transition year and FY 2020 to FY 2023 as the remaining four years.

## Assessing the Quality of CTE Programs

For much of their history, CTE programs remained separate from traditional academic programs and resources. Moreover, researchers have noted that CTE education in the U.S. has been underrepresented in the field of educational research and has lacked longitudinal datasets on student outcomes in CTE subjects and career areas.[11]

Recognizing the need for more data on student participation in CTE programs and educational and career achievements, Perkins V expanded the number of performance measures states must report as part of their Perkins applications from seven to 11.[12] States must report the following measures by race, ethnicity, gender, and special population category:[F]

[E] The comprehensive local needs assessments must evaluate states' CTE programs and their: performance on federal accountability indications; alignment to labor market needs; scope, size, and quality of programs offered; progress toward implementing programs and programs of study; recruitment, retention, and training of faculty and staff; and progress toward improving access and equity.
Carl D. Perkins Career and Technical Education Act of 2006, 20 U.S.C. § 2301 as amended by Consolidated Appropriations Act, 2019, Pub. L. No. 116-6 § 134(c)(1).
[F] For more details on the core indicators, and to see the postsecondary indicators, visit https://cte.ed.gov/accountability/core-indicators.

- **Four-year graduation rate:** The percentage of CTE concentrators[G] who graduate high school, as measured by the 4-year adjusted cohort graduation rate.
- **Extended graduation rate (at the state's discretion):** The percentage of CTE concentrators who graduate high school, as measured by extended-year adjusted cohort graduation rate.
- **Academic proficiency in reading/language arts:** CTE concentrator proficiency in state academic standards for reading/language arts.
- **Academic proficiency in mathematics:** CTE concentrator proficiency in state academic standards in mathematics.
- **Academic proficiency in science:** CTE concentrator proficiency in state academic standards in science.
- **Post-secondary placement:** The percentage of CTE concentrators who are in postsecondary education (or employment, military, or other volunteer service) in the second quarter after exiting from secondary education.
- **Non-traditional program enrollment:** The percentage of CTE concentrators in CTE programs and programs of study that lead to non-traditional fields.
- **Program quality — attained recognized postsecondary credential:** The percentage of CTE concentrators graduating from high school having attained a recognized postsecondary credential.
- **Program quality — attained postsecondary credits:** The percentage of CTE concentrators graduating from high school having attained postsecondary credits in the relevant career and technical education program, or program of study, earned through a dual or concurrent enrollment or another credit transfer agreement.
- **Program quality — participated in work-based learning:** Percentage of CTE concentrators graduating from high school having participated in work-based learning.
- **Program quality — other:** The percentage of CTE concentrators achieving on any other measure (identified by the state) of student success in career and technical education that is statewide, valid, reliable, and comparable across the state.

In addition to new federal student performance measures, interest has grown in developing consistent, high-quality CTE programs throughout the U.S. As discussed earlier, national CTE clusters were designed as a means for ensuring quality and uniformity in CTE programs across states. A 2013 study of state CTE programs by the National Association of State Directors of Career Technical Education Consortium (now AdvanceCTE), found many states have adopted the nationally developed CTE clusters as a model, but few have implemented this framework in a way that impacts instruction.[13] Most states use the national standards as a conceptual framework for organizing and communicating their existing frameworks rather than as standards themselves. The clusters were designed around career paths that can be used in a variety of different CTE programs. However,

[G] Perkins V defines a CTE concentrator as a secondary student who has earned three or more credits in a single CTE program area (e.g., health care or business services), or two credits in a single CTE program area, but only in those program areas where two credit sequences at the secondary level are recognized by the State and/or its local eligible recipients.
Carl D. Perkins Career and Technical Education Act of 2006, 20 U.S.C. § 2301 as amended by Consolidated Appropriations Act, 2019, Pub. L. No. 116-6 § 3(12).

in its study, Advance CTE found the majority of states have standards that focus on occupationally-specific or job-focused content, rather than programs of study-level standards that are designed to help students succeed through secondary and post-secondary coursework for a broader range of careers.[14]

Another national CTE program, the Association for Career and Technical Education (ACTE), has developed a voluntary framework to help policymakers better define high-quality CTE programs and highlight best practices.[15] The 2017 framework identified 12 CTE program elements and criteria within each element, including: a curriculum aligned with industry standards with integrated knowledge, a sequence of courses and competencies designed to lead to postsecondary education, prepared and effective program staff, and CTE programs that are accessible to traditionally underrepresented students and free of bias. This framework, coupled with federally-required data, provides policymakers with more information to use when assessing the quality and effectiveness of CTE programs.[16]

## Types of CTE Programs

Under Perkins V, states are generally responsible for overseeing CTE programming quality and accountability, but the implementation of CTE programs varies by region and district. A recent state survey found in a majority of states, the state education agency is responsible for implementing CTE programs using federal Perkins V funds.[17] In 15 states, a different agency (such as the community college system) serves as the eligible agency under Perkins V (for both secondary and postsecondary program), and often multiple agencies are responsible for the development of CTE programs.[18] Oversight of programs at the secondary level may fall under the purview of the local school CTE district, county board, or regional school committee. Nationally, over 8.3 million secondary students participated in CTE programming (defined as secondary students taking at least one credit in a CTE course) in FY 2017, and about 3.5 million of those students were CTE concentrators.[19]

Secondary school students can participate in CTE programming through different delivery models. Researchers generally describe secondary CTE programs using one of the following categories:[20]

- **Career academies**: Schools-within-a-school that focus on a particular theme, such as health care or technology.
- **Career/technical high schools:** Self-contained schools that offer both CTE and academic coursework, with a focus on CTE. All students specialize in CTE. The Connecticut Technical Education and Career System (CTECS) is an example of this type.
- **Regional technical centers:** Specialized programs in comprehensive high schools (high schools with embedded CTE programs) or academically selective regional vocational and technical schools specialized in a specific industry or topic where all students concentrate in CTE. Connecticut's regional vocational-agricultural programs are regional technical centers.

- **Special focus schools:** Special program emphasis schools, such as science or mathematics schools, performing arts schools, talented or gifted schools, and foreign language immersion schools. The content area is not tied to a specific industry or cluster of careers. Many of Connecticut's magnet schools are special focus schools.
- **Dual enrollment:** Students take college courses (either academic or CTE) while still enrolled in local high school. The University of Connecticut's Early College Experience[21] and the College Career Pathways program[22] with community colleges are examples of programs where high school students take college-level coursework at high school for college credit.

Another CTE model developed in recent years provides students with both a high school and postsecondary degree with industry experience.mFor example, IBM has partnered with states and school districts to develop over 100 P-TECH (Pathways in Technology Early College High Schools) public schools for grades 9-14 that provide students with a tuition-free high school and associates degree program in a STEM field.[23] The first P-TECH school opened in Brooklyn, New York in 2011 and there are now P-TECH schools in several states including Connecticut, Maryland, New York, and Rhode Island.[24] In the P-TECH model, states are required to partner with local businesses and industry in developing the 6-year CTE program.

## State Career and Technology Education Funding Approaches

States use many different methods for funding CTE programs at the secondary level, generally directing additional funds to districts to account for the smaller class sizes, hiring of specialized staff, and increased capital costs involved with providing technical and specialized coursework and training. Research on state funding of CTE programs has been scant, and Perkins V seeks to address this with research grants to address this topic.

The U.S. Department of Education contracted with the National Center for Innovation in Career and Technical Education in 2013 to survey state directors of career and technical education on how they allocated federal and state resources for CTE education.[25] The survey found state approaches varied in terms of emphasis and complexity of funding models, but states generally fell into one of several categories. These categories, and the states that use each one, are detailed in the table below.[H]

[H] Because the data in the survey were from FY 2012, EdBuild's CTE funding database was also used to review whether the data categories were still current. This database is available at http://funded.edbuild.org/national#cte.

**Description of CTE Funding Approaches[26,27]**

| Types of State CTE Funding | Description of Funding Type | Example of State or States Using this type |
|---|---|---|
| **Foundational Funding** | State funding for CTE education is part of the overall state grants (foundational aid) to local school districts, and local school district leaders determine whether and how to allocate funds for CTE programming. | Maryland |
| **CTE Centers** | States target CTE funds exclusively to established, standalone CTE centers that provide full or part-time CTE services to students. Foundational funding provides CTE programming in local secondary schools. | Connecticut, New Jersey, and New York |
| **Categorical funding formula based on student enrollment** | States condition funding allocations based on the number of students enrolling in CTE programs. | Pennsylvania |
| **Categorical funding formula based on program costs** | States allocate CTE funds based on needs for additional resources (such as additional staff or facilities) for CTE programs. | Massachusetts |
| **Categorical funding formula based on cost reimbursement** | States provide funds to local districts to compensate them for providing CTE services, with compensation rates based on prior year's expenditures. | Minnesota, Rhode Island |

In order to better understand Connecticut's approach to funding CTE programs, it is necessary to review funding approaches in other states. The comparison states reviewed in this policy briefing are Maryland, Massachusetts, Minnesota, New Jersey, New York, Pennsylvania, and Rhode Island. These states were selected to represent the different types of CTE funding approaches, mostly from the northeast, with several of the states also funding standalone CTE programs. Minnesota represents a unique funding approach in that the State permits districts to levy property taxes specifically to fund CTE programs.

## Connecticut[I]

### *Program Overview*

Connecticut students may receive CTE programming through several different types of schools: comprehensive high schools (including magnet high schools); 17 dedicated, comprehensive CTE high schools called the Connecticut Technical Education and Career System (CTECS); and 19 regional vocational-agricultural (Vo-Ag) programs under the Agricultural Science and Technology Education program.[J] Connecticut also offers CTE programs through magnet schools that specialize in CTE programs. For example, the Hill Regional Career High School is an interdistrict magnet school, hosted by New Haven Public Schools, which offers coursework in the health sciences and partnerships with the Yale School of Medicine, the Yale School of Nursing, the Department of Nursing at Southern Connecticut State University, and regional hospitals.[28]

### *P-TECH Schools*

Additionally, Connecticut has four P-TECH schools available through: the Danbury Early College Opportunity program, Science and Technology Magnet High School of Southeastern Connecticut (in New London), the Norwalk Early College Academy, and the Windham Early College Opportunity program.[29] The Norwalk Early College Academy was the first P-TECH school in Connecticut and opened in 2014 as a collaboration with Norwalk Public Schools, Norwalk Community College, and IBM.

### *Career Clusters*

Connecticut revised its approved CTE career clusters in FY 2018 through the Perkins V state planning process. (The approved clusters are listed in Appendix C of this report). In June 2019, the Connecticut State Department of Education (CSDE) submitted a 1-year CTE Transition Plan for the FY 2019 school year, with the intention of developing a full CTE State Plan in FY 2020 for FYs 2020-2023.[30] This transition plan was approved by the U.S. Department of Education in July 2019.

### *Governance of CTE Programs*

Governance for CTE programs varies by the type of school offering the program. Technical high schools are full-time secondary CTE programs authorized by the Connecticut State Board of Education (SBOE) and run by the CTECS.[31,K] An exception is the Bristol Technical Education Center, which is part of the CTECS, but only provides technical education and is limited to 11th and 12th grade students (the school also provides adult education). The CTECS is the only fully state-operated and funded CTE program in the country.[32]

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[I] This section is accurate as of December 17, 2021 and reflects all Connecticut statutory changes prior to this date. Sections containing other states' approaches will not be updated going forward and are accurate as of August 23, 2019.

[J] A 20th Vo-Ag center, located at the Shepaug Valley School and operated by Regional School District 12, is scheduled to open in September 2019.

[K] CTECS schools also receive accreditation from the New England Association of Schools and Colleges' Committee on Technical and Career Institutions, which accredits different types of CTE programs throughout New England.

The commissioner of the CSDE is responsible for staffing the CTECS, establishing rules for the management of funding for the CTECS, and expending funds appropriated from Connecticut's General Fund for the CTECS.[33] In addition, each technical high school has an advisory committee with members from the local business communities.[34] The CTECS Board develops policies for the System, under the SBOE.[35] The CTECS Board recommends candidates for system-wide superintendent to the commissioner of CSDE, who may accept or reject the candidate.[36] If rejected, the CTECS Board makes additional recommendations until one is accepted by the commissioner. The CTECS Board is scheduled to transition to an independent agency beginning July 1, 2022,[37] with all members appointed directly by the governor.[38] The commissioners of the CSDE, the Connecticut Department of Economic and Community Development, and the Connecticut Department of Labor (DOL) will serve as ex-officio board members.

Vo-Ag centers are operated by local and regional school boards of education after being approved by the SBOE.[39] Each Vo-Ag center must prepare its budget and submit it annually to the center's respective board for approval.[40] Vo-Ag centers have specialized curriculums with requirements that students spend at least 320 minutes a week in vocational-agricultural classes.[41]

Local high schools (including interdistrict magnet schools) that offer CTE education are overseen by their local board of education and district administration. Districts seeking CTE-specific grants under Perkins V must apply directly to the CSDE with a proposed budget and related narrative that describes their programs in at least one of the approved CTE programs: agricultural science and technology, business and finance, cooperative work education, family and consumer sciences, marketing education, medical careers, and technology education.[42] Connecticut's DOL oversees the P-TECH schools and has renamed them to Connecticut Early College Opportunity (CT-ECO) schools.[43]

### *Funding of CTE Programs*

Connecticut does not provide any state aid specifically for CTE programs. Instead, state CTE funding is based on school type.

### *Connecticut Technical Education and Career System (CTECS)*

The CTECS is funded entirely through appropriations from Connecticut's General Fund. In FY 2019, the State appropriated $152.86 million to the CTECS. Students who attend CTECS schools are excluded from the resident student count for the Education Cost Sharing (ECS) grant for their resident town because the local district is not responsible for the cost of educating students enrolled in the CTECS. CTECS teachers are considered state employees and have the option of electing to join the State Employee Retirement System (SERS), a defined-benefit pension system (with Social Security contributions) or the state Teachers' Retirement System (TRS), a separate defined-benefit pension system where teachers do not contribute (or receive) Social Security benefits.[44] Unlike other school choice programs in Connecticut, CTECS students needing special education services have those costs paid for by the CTECS program, not the sending district.[45]

### *Vocational Agriculture Programs*

Local and regional boards of education operate Vo-Ag centers and receive several streams of funding for center operations, with the state providing a base grant of $5,200 per student based on the previous year's enrollment with additional state grants based on enrollment.[L] Districts operating Vo-Ag centers may charge a sending district tuition, up to $6,822,80 per student. School districts' ECS grants include students in their districts attending Vo-Ag centers as part of the district's resident student count.[46]

### *Local Districts*

Local district spending on CTE programs comes from general state grants through the ECS grant and from federal Perkins funds allocated by the CSDE. The CSDE provides technical assistance to local school districts that provide CTE education for their students and who receive Perkins funding. In FY 2019, 101 districts received federal grants, as did the CTECS and each of the three endowed academies.[47]

### *Enrollment*

Admission to CTE programs depends on the type of school. Each technical high school in the CTECS serves a specific geographic area, but enrollment is open to any student in Connecticut. Each of the CTECS schools maintains a waitlist, ranging from one student to over 400 students for the FY 2018 school year.[48] Students meeting the admissions criteria may apply to up to four technical high schools through a form submitted to the local school. The three technical high schools in the Hartford region administer admissions through the Regional School Choice Office (RSCO) lottery, which also includes magnet schools in the Hartford area. Vo-Ag centers also have admissions criteria and admissions processes for students. If local or regional boards of education do not offer Vo-Ag to their students, they must designate another center to their students with an agreement with that center. Magnet schools with a CTE focus have regional lotteries where students may opt to apply for a variety of high school choices.

[L] For additional information on Connecticut's Vo-Ag program and funding, see:
School and State Finance Project. (2021). *Connecticut's Agricultural Science and Technology Education (Vo-Ag) Program*. Hamden, CT: Author. Retrieved from https://ctschoolfinance.org/resource-assets/Connecticuts-Vo-Ag-Program.pdf.

## Maryland

### *Program Overview*

Maryland offers CTE programs through comprehensive and technical high schools. The Maryland State Department of Education (MSDE), in partnership with statewide industry advisory groups, has identified 10 career clusters that reflect separate segments of the economy that have distinct and similar skill requirements. Each career cluster includes multiple CTE program options for CTE students to understand the requirements of a particular career.[49] A list of these 10 career clusters is in Appendix C.[50] The MSDE requires local school districts to align their CTE programs to the clusters and adhere to local graduation and data reporting requirements.[51] Local CTE programs are reviewed by a local director and approved by the MSDE.

Maryland is the midst of a larger education policy reform and funding formula reform discussion, in which the Commission on Innovation and Excellence in Education has proposed establishing a CTE committee as part of the Governor's Workforce Development Board, with dedicated staff to monitor and provide annual reports on the performance of the state CTE system, and a separate Skills Standard Advisory Committee, which will set the standards for work-based learning and apprenticeships as part of CTE learning.[52] The Commission is scheduled to its final report in late 2019.

### *P-TECH Schools*

In 2016, Maryland began creating P-TECH schools as schools-within-schools for grades ninth to 14th that allow students to graduate with both a high school diploma and a no-cost, two-year associates degree. Maryland currently has seven P-TECH schools in five different school districts.[53] The schools with P-TECH programs vary. For example, in Baltimore there are three different types of P-TECH high schools: Paul Lawrence Dunbar High School, a traditional school; Carver Vocational-Technical High School, a specialty career technology center and college preparatory school; and New Era Academy, a specialized, choice program.[54]

### *Governance of CTE Programs*

The Maryland State Board of Education is responsible for developing secondary CTE programs and for approving the CTE clusters. Maryland state statute requires local recipients of Perkins funding to have a Local Advisory Council with representatives from industry, organized labor, and the general public. Educators and education administrators may serve as ex-officio members on Local Advisory Councils.[55] Local Advisory Councils work to promote awareness of CTE programs, make recommendations to improve the local system of CTE, and review data on CTE program performance.[56] Each CTE program must have a Program Advisory Committee, with members who have knowledge and expertise in the industry served by the program. Program Advisory Committees provide input on the development of the programs, curriculum and equipment needs, and student work-based learning opportunities.[57]

### *Funding of CTE Programs*

Maryland's state aid to school districts is through its student-based funding formula.[58] Maryland does not provide additional or categorical funding for CTE programs, which means local districts rely on state foundational funding to support CTE programs.[59] Since

Maryland does not offer categorical funding for CTE programming, local districts decide whether to offer CTE programs and how funds for CTE programs should be distributed.

Starting in 2016, Maryland began providing grants to local districts specifically for specialized technical schools under the Career and Technology Education Innovation Grant program. In FY 2019, $2 million in funding was allocated for grants ranging from $25,000 to $150,000.[60] These grants fund partnerships between at least one local board of education, community college, and industry partner to develop and implement an innovative, high-quality CTE program.[61]

Maryland passed legislation related to the funding of P-TECH schools in 2017. This allowed school districts to count students in the fifth and sixth years of the program (grades 13 and 14) as part of their resident student counts for the state foundational formula aid program: students count for 50 percent for fifth year students and 25 percent for sixth year students. Maryland also provides additional grants of $750 per student to school systems with P-TECH programs and offers supplemental support to community colleges.[62]

***Enrollment***

Admission to CTE programs varies by district and program. Some CTE secondary programs are offered in choice schools that admit students by lottery. For example, in Baltimore City Public Schools, students enter a lottery for choice programs in high school.[63] Some CTE programs have admissions criteria with academic requirements, required student interest, and essay questions. Some choice programs with a CTE component may have waitlists. There are no specific entrance requirements for the P-TECH program, but there is a requirement that schools reserve at least 50 percent of the available space in P-TECH programs for students from families eligible for free and reduced-price meals.[64] The MSDE has developed a technical assistance bulletin to guide local districts in ensuring they are providing their students with sufficient access to CTE programs and engaging in non-discriminatory practices in their admission process and criteria.[65]

## Massachusetts

### *Program Overview*

Massachusetts provides secondary CTE education through comprehensive high schools (with embedded career academies) run by local districts, regional vocational high schools, vocational schools operated by local districts, and county agricultural schools.[66] Currently, there are approved CTE programs in 45 local school districts; 26 regional vocational school districts; two county agricultural school districts; one independent vocational and agricultural school district; one educational collaborative; nine academic regional school districts; and two charter schools.[67]

Most commonly, Massachusetts cities and towns operate their own pre-kindergarten through grade 12 academic system and belong to a vocational regional school district.[68] The regional vocational high schools are standalone districts focused solely on CTE programs.[69] Cities and towns in Massachusetts also may establish and operate independent vocational-technical schools in their own school districts.[70]

Massachusetts has three unique agricultural schools that date back to the early 20th century, and whose existence is codified in state statute. Bristol County Agricultural School (founded in 1912) and Norfolk County Agricultural School (founded in 1915) are both state-aided independent vocational schools.[71] The Northampton-Smith Agricultural Vocational High School has a unique status in Massachusetts as a state-aided school maintained by the City of Northampton, but open to residents of other towns and governed by Northampton's mayor and superintendent of schools under specific terms outlined in statute and in the terms of the founder's bequest.[72]

### *Governance of CTE Programs*

The commissioner of the Massachusetts Department of Elementary and Secondary Education (DESE), under direction of the Massachusetts Board of Elementary and Secondary Education (BESE), must approve public vocational technical education programs (known as Chapter 74 programs) by district and school.[73] All Massachusetts CTE programs must align with 11 career clusters and over 40 related career programs.[M] Each school district, county agricultural school, collaborative, or municipality operating an approved vocational-technical program must have an advisory committee with representatives from local business and industry, organized labor, parents, and students.[74]

Regional vocational high schools are formed when two or more towns organize a regional school committee. These committees have separate school boards with representatives — referred to as trustees — from each member town, either appointed by the committee or elected by the town.[75] Bristol County Agricultural School and Norfolk County Agricultural School are governed by boards of trustees consisting of former county commissioners and county residents appointed by the governor with the advice and consent of the county government.[76]

With their independent committees, Massachusetts regional and independent technical schools are largely free to implement changing standards and curriculum changes

[M] A list of Massachusetts' CTE clusters can be found in Appendix C.

based on industry needs. A recent study of the state's improved test scores for CTE students highlighted the collaboration among administrators through the DESE and the Massachusetts Association of Vocational Administrators as a means of ensuring uniform success and a way to provide support across schools.[77]

### *Funding of CTE Programs*

Vocational education in Massachusetts for grades 9-12 is a separate category in the state education funding formula, called a "foundation budget enrollment category," and state aid is increased for districts with CTE programs.[78] The foundation enrollments are applied to specific cost rates in 11 functional areas related to school spending: administration, instructional leadership, classroom and specialist teachers, other teacher services, professional development, instructional equipment and technology, guidance and psychological, pupil services, operations and maintenance, employee benefits/fixed costs, and special education tuition. Each pupil generates a specific cost in each functional category, with higher costs for vocational programs. It is estimated that districts with students enrolled in vocational programs received an additional $4,500 on average in state aid per CTE student, depending on the district, in FY 2016.[79]

Districts with CTE programs may charge non-residents tuition fees that are approved by the commissioner of the DESE.[80] The Chapter 74 non-resident tuition program covers vocational students attending school outside of their resident district when their home vocational district does not offer the program they are seeking.[81] If a town is a member of a regional vocational district, then its resident students are not counted in local district enrollment counts. The vocational district reports these students and Chapter 70 aid goes directly to the vocational district.[82]

Local districts are eligible for transportation reimbursements for students attending CTE programs in other municipalities (subject to appropriations) for students in grade 12 or lower, and for students living at least a mile and a half away from the school.[83] For the two independent vocational schools, the district trustees may pay for student transportation if other funds are unavailable.[84]

The boards of trustees for the Bristol County Agricultural School and Norfolk County Agricultural School are responsible for preparing the budget for their respective school, and have the authority to raise operating funds through county taxes.[85] Any income raised from CTE programs at these schools is returned to the school for its operations.[86]

### *Enrollment*

All regional technical secondary schools and comprehensive secondary schools must develop admission policies that are approved by the DESE specifying eligibility requirements and requirements for each grade.[87] Each school must identify as either: a local public school, a regional school (vocational-technical or academic), county agricultural school, or independent vocational school. Schools must define and describe the region they are obliged to serve, how seats within the school are allotted, the conditions under which students from outside of the service region will be accepted, and how school choice students are accepted. Bristol County Agricultural School and Norfolk County Agricultural School are open to any resident and free to all residents of Bristol and

Norfolk Counties.[88] CTE programs in Massachusetts have high demand from students and long waitlists, especially in cities.[89,90]

## Minnesota

### *Program Overview*

Minnesota's secondary CTE programs are found in comprehensive high schools, charter schools, and alternative schools.[91] The Minnesota State Colleges and University system (also known as Minnesota State) and the Minnesota Department of Education (MDE) have collaborated to develop technical skill assessments for CTE programs offered in high schools and colleges in the state. They update the technical assessments and related career clusters every five years.[N] Minnesota also has developed CTE programs of study as a set of aligned programs and curricula that students follow starting in high school and continue into college.

### *Governance of CTE Programs*

Local districts, cooperative districts, and charter schools seeking federal CTE funds for their programs must submit a program approval to the MDE.[92] The Department also approves the CTE expenditures districts may submit for partial reimbursement from the State. However, it is the Minnesota State Colleges and University system that oversees the content of CTE education at the secondary and postsecondary levels and the allocations of federal funds under the Perkins grant.[93]

### *Funding of CTE Programs*

Notably, Minnesota allows school districts offering CTE programs to impose special property taxes (called a CTE levy) to fund approved CTE programs and receive partial matching funds from the State.[94] Districts with an approved CTE program may impose a levy to fund an amount equal to 35 percent of approved expenditures with some limitations.[95] Expenditures allowed by statute include: CTE staff salaries, contracted services related to CTE, CTE staff travel, curriculum travel, travel for CTE staff for professional development, and specialized CTE supplies.[96] Each year in the spring, school districts submit anticipated CTE expenditures using web-based reporting for the following school year, including detailed information about the actual CTE expenditures from the prior school year.[97]

In general, Minnesota provides state funds to district and charter schools through its general education revenue program, as well as categorical aids, adjusted by the net tax capacity (level of property wealth).[98] Other categorical aids include special education and transportation. The state legislature also controls the amount each school district can levy through limits on the amounts and type of property tax levies. Local school districts that offer CTE programs are eligible for state aid through and equalized aid and levy. The revenue formula for CTE programs is 35 percent of the district's approved expenditures on CTE programming, but not less than the revenue authority for the previous year, provided revenue does not exceed 100 percent of the district's CTE expenditures for that year. For FY 2019, the state aid was $4,125,000 and the levy was $28,111,000.[99]

### *Enrollment*

Admission to CTE programs varies by district and school type. Students may apply to attend a school outside of their district, through a statewide open enrollment program.[100]

[N] A list of Minnesota's career clusters can be found in Appendix C.

To help students in deciding whether a specific CTE program would be useful for their career goals, Minnesota requires all students beginning no later than ninth grade to develop a personal learning plan around key elements, including academic scheduling, career exploration, career and employment-related skills, community partnerships, and experiential learning opportunities.[101]

## New Jersey

### *Program Overview*

New Jersey's secondary-level CTE programs are available in comprehensive high schools, charter schools, and county-based vocational-technical high schools. [102] Each of New Jersey's 21 counties operate vocational-technical high schools that serve over 31,000 students with different types of programs at each school.[103,104] Some counties operate several vocational-technical schools and some schools have multiple campuses throughout the county. All New Jersey CTE programs must be aligned with 16 career clusters, which are the same as the national clusters developed by AdvanceCTE.[105]

Starting in FY 2019, three New Jersey public high schools will receive some state funding, as well as Perkins grants, to develop grades 9-14 P-TECH schools within existing high schools and in partnership with community colleges and corporate partners.[106] The schools participating are local public schools in Burlington City, New Brunswick, and Paterson.

### *Governance of CTE Programs*

New Jersey's Office of Career Readiness, an office in the New Jersey Department of Education, is responsible for the implementation of secondary CTE programs throughout the state, including approving programs and distributing federal funds under Perkins V.[107] The county vocational schools operate under distinct county districts, each of which has an independent board of education, the members of which are appointed by the county Board of Freeholders (a countywide legislative body).[108] The county vocational schools operate independently of the local school districts in the state.

### *Funding of CTE Programs*

New Jersey's state funding formula for local districts includes an additional weight for students attending a county vocational district school. The calculation compares the base model cost per pupil for high school students, ($13,621) with comparable county vocational school per-pupil expenditures ($16,610) — the base cost excludes costs for special education, at-risk, and bilingual programs. This leads to an additional weight of 0.22 for vocational districts' per pupil state aid.[109] Local districts, county vocational, and charter schools also receive federal Perkins V funding for their CTE programs.[110]

Each student's sending district is required to pay any tuition charged by the vocational-technical school and provide transportation for the student.[111] Tuition from resident districts may not exceed the actual cost per pupil (with separate tuition rates for students in special education programs).[112] The counties themselves receive funds from the county Boards of Freeholders, local districts, and from state and federal sources, including grants. Local high schools and charter schools may receive federal Perkins grants but not specific state CTE funding.

### *Enrollment*

New Jersey's county vocational-technical high schools are open to all secondary school-age residents in the county. The each have different application and admission processes depending on the program.[113] Demand for county CTE programs has increased so some programs have long waitlists. County CTE schools are viewed as

choice schools that compete with local high schools, and have their own admissions policies and strong connections to local community colleges.[114] Some choice programs with a CTE component may have waitlists.

## New York

### *Program Overview*

The State of New York offers CTE secondary programs through comprehensive high schools, technical high schools, and career academies managed by local school districts and regional cooperatives called Boards of Cooperative Educational Services (BOCES).[115] New York's Office of Career and Technical Education (within the State Education Department (NYSED)) has organized the state CTE program into six content offerings.[116,O] New York considers CTE education to be a component of learning throughout a child's educational experience, starting in preschool, and requires all public school districts to offer students the opportunity to complete a 3-to-5 unit CTE sequence.[117]

### *Governance*

New York has 37 regional BOCES, located throughout the state, to provide shared educational programs and services to school districts within their specific regions.[118] BOCES membership is not available in the largest cities: New York, Buffalo, Rochester, Yonkers, and Syracuse.[119] Each BOCES has its own district superintendent who is responsible for both the BOCES and its member districts, and also serves as the representative of the commissioner of the NYSED to the region.[120] BOCES provide other services to districts besides career education, such as instructional support or technology services.

The Office of Career and Technical Education approves CTE programs for the secondary level for all types of schools.[121] Students graduating from approved CTE programs receive the CTE endorsement on their diplomas. The New York Career and Technical Education Technical Assistance Center (CTE TAC) is a privately-run resource center that has been awarded a state contract by the NYSED to assist the Department in carrying out its mission to improve the quality, access, and delivery of CTE through research-based methods resulting in broader CTE opportunities for all students.[122] CTE TAC is contracted to engage in CTE professional and leadership development activities, approve local CTE programs, highlight best practices, enhance marketing of CTE programs, and develop stronger CTE networks in the state.

### *Funding of CTE Programs*

New York provides reimbursement aid to the BOCES for the costs of approved services (which includes, but is not limited to, CTE programs) based on the district's proportionate level of participation in services provided by the BOCES, taking into account the district's financial resources.[123,124] The estimated state aid to BOCES for FY 2019 was $931.9 million.[125] New York also provides direct educational aid to the five cities not involved with the BOCES specifically for career education through the Special Services Aid grant. The formula for calculating career education aid is $3,900 per pupil, multiplied by the career education aid ratio, multiplied by the prior year's weighted career education pupils. The weighted career educational pupils include differentiated funding based on CTE program. The formula is the sum of attendance of students in grades 10-12 in trade, industrial, agricultural, or health CTE programs, plus 0.16, multiplied by the attendance of

O A list of New York's career offerings can be found in Appendix C.

students in grades 10-12 in business and marketing CTE programs. In FY 2019, the estimated Special Services Aid grant was $154.2 million.[126]

New York has also begun expanding the number of P-TECH schools since the first opened in Brooklyn in 2001.[127] The State began offering grants under the New York State Pathways in Technology Early College High School partnership initiative for developing P-TECH schools starting in 2014, and today there are 33 P-TECH programs throughout the state.[128,129] In February 2019, the NYSED announced competitive grants were available to local districts and the BOCES, in a new round of funding, with applications due in April 2019.[130] The NYSED estimates $24 million in funding will be available for developing P-TECH schools over a 7-year grant period.

### *Enrollment*

All New York public school districts must offer access to CTE programming, but entry to specific CTE programs varies by district and BOCES. For example, New York City has an open enrollment policy for secondary programs. Therefore, all CTE programs are part of the general high school lottery process. Demand for some choice programs in New York City exceeds available capacity. Students are encouraged to attend at least one information session to demonstrate their interest.[131] In addition to having technical high schools and CTE dedicated schools, New York City has several embedded career academies.

## Pennsylvania

### *Program Overview*

Pennsylvania offers CTE programs through comprehensive high schools, charter schools, and regional career and technical centers (CTCs). In 2018, Pennsylvania had over 1,700 approved CTE programs in 219 schools.[132] There are 84 CTCs across six regions of the state that enter into contracts with local districts to provide specific CTE programming. Pennsylvania has identified 12 industry clusters (with related subclusters) that reflect employment opportunities in the state.[P133] The Pennsylvania Department of Education's (PDE) Bureau of Career and Technical Education coordinates an ongoing review of the state CTE programs and their alignment with the state's workforce development priorities.[134] In addition, the PDE requires all public schools to integrate approved academic standards for Career Education and Work for all students.

### *Governance of CTE Programs*

The PDE approves locally-administered CTE programming using state and federal funds. Pennsylvania also offers a number of supports for local CTE programs, including:

- A designated Career and Technical Distinguished School Leader to each school who serves as a CTE training coach for teachers and administrators through its Technical Assistance Program;
- A website dedicated to highlighting promising practices in CTE education in the state: http://pacteresources.com;
- A joint operating committee that acts as a school board for each regional CTE center, with members from participating districts;
- Occupational advisory committees at every CTE program with local industry leaders; and
- Career and technical student organizations, student-run organizations recognized by Perkins V and present at each CTE program.[135]

Pennsylvania contracted with a consultant in 2012 to create a guidebook to improve communications among career and technology directors, joint operating committees, and sending school superintendents.[136] It also contracted with a consultant to analyze other ways the CTE system can improve student outcomes and better align with industry needs.[137]

### *Funding of CTE Programs*

Pennsylvania provides categorical aid for CTE programs through a state subsidy allocated to local districts and charter schools by student participation and through competitive grants for school districts with approved CTE programs to update or purchase CTE-related training equipment. The grants are for up to $50,000 per applicant.[138] In 2018, Pennsylania estimated that local CTE programs are funded approximately 85 percent with local funds, 10 percent with the state subsidy, and five percent from federal Perkins funds.[139]

[P] A list of Pennsylvania's career clusters can be found in Appendix C.

Pennsylvania's CTE subsidy is designed for funding for specified education programs approved by the secretary of the PDE. The calculation of the subsidy is calculated by determining the vocational average daily membership (VADM) by either 0.21 for students at career and technology centers or 0.17 for students in local school districts or charter schools.[140] The based earned for reimbursement (BER) is determined by using the state medial actual instruction expense per weighted average daily membership (AIE/WADM) and the equalized mills. The fully-funded amount equals the lesser amount of the AIE/WADM or the BER multiplied by the greater of the market value/personal income air ratio or 0.3750 multiplied by the VADM. The proposed budget for FY 2020 for the state subsidy is $66.6 million.[141]

***Enrollment***

Pennsylvania state statute requires local districts to provide open access to CTE programs, and districts may not limit attendance to students eligible to attend a CTC.[142] Further, a CTC may not limit attendance to participating districts and must include eligible charter school students. If a charter school student attends a CTC, the charter school must use its expenditures to pay the CTC.[143] Pennsylvania notes that enrollment in CTE programs has increased by five percent over the past seven years, even as the overall secondary school enrollment has decreased by 3.5 percent.[144]

## Rhode Island

### *Program Overview*

Rhode Island's CTE system provides secondary-level CTE programs through comprehensive high schools, charter schools, and seven CTE centers run by local districts. In addition, Rhode Island has two state-operated career and technical high schools: William M. Davies, Jr Career and Tech School in Lincoln and the Metropolitan Career and Technical Center (Met Center), a network of six small, public high schools located in Providence and Newport. Davies is a regional, comprehensive high school that provides students CTE programs in automotive, electrical, machine technology, pre-engineering, biomanufacturing technology, cosmetology, health, hospitality, and graphics and interactive media career fields.[145] The Met Center schools provide students with internships with local buinsesses and college-level coursework.

### *Governance of CTE Programs*

Currently, Rhode Island does not use a set of CTE career clusters for guiding or organizing state CTE programs.[146] Instead, the Rhode Island Department of Education (RIDE) publishes a list of approved CTE programs. The list includes local high schools, CTE centers, and technical high schools.[147] Approved career preparation programs offer at least three, connected, rigorous non-duplicative career and technical education courses.[148] The CTE Board of Trustees was established in 2015 to advise Rhode Island's Commissioner of Elementary and Secondary Education and the Rhode Island Board of Education on ways to strengthen the state's plan for CTE programs, including ways to better prioritize funding for CTE programs.

In 1991, the Davies School became a "limited-purpose" local education authority (LEA) with an appointed board of trustees. The authorizing statute allowed for additional CTE schools to be built using Davies as a model, but the State has not built additional CTE schools modeled after Davies.

### *Funding of CTE Programs*

The State provides local districts with a portion of per-pupil costs for high-cost CTE programs for start-up costs and for new or transformed CTE programs. The amount dedicated to the high-cost reimbursement versus the new and transformed programs is determined annually by the Rhode Island General Assembly based on CTE needs throughout the state.[149] The high-cost program reimbursement is limited to programs that have been approved by the RIDE.[150] The RIDE must prorate the funds available for distribution among those eligible school districts if the total approved costs for reimbursement exceeds the amount of funding available in any fiscal year.[151]

The RIDE conducts an application process for grants for new and transformed programs. For the high-cost CTE reimbursement, payments are based upon uniform chart of accounts expenditure data for department-approved CTE. The per-pupil expenditures are averaged over a 3-year period by program category. Every eligible program is then reimbursed the per-pupil amount within each CTE program category, regardless of the actual amount of the per-pupil expenditures. Davies and the Met Center receive state-budgeted stabilization funds from the State. When those funds are not suffiecent to cover

costs, funds are prorated from local districts. Charter schools also receive a local share of funding.[152][153]

The funding and organization of Rhode Island's CTE programs currently are under review, and in 2015 the State received a New Skills for Youth grant from JPMorgan Chase & Co. and the Council of Chief State School Offers to enhance its CTE efforts. In 2017, the State used this grant to launch "Prepare Rhode Island" to restructure and realign its programs and funding streams.[154] Part of this initiative is increasing access to CTE programming through 2020.[155]

***Enrollment***

Local districts determine admission to their CTE programs. The RIDE does not oversee student recruitment or admission to CTE programs. However, the State requires local districts operating CTE programs to develop fair, equitable, and reasonable admission standards. They can also develop admissions criteria. Davies requires students to pass entrance exams in English and math.[156] The Met Center has a lottery and requires students to complete written essays as part of the application process.[157]

## Appendix A: Federal Funding and Size of Selected State CTE Programs

| State | FY 2019 Perkins V Grant[158] | % of State's Federal Grant Spent on Secondary Schools (FY 2016)[159] | # of High Schools Primarily or Solely Offering CTE Courses in FY 2016[160] | # (and %) of High School Students Enrolling in CTE Coursework in FY 2016[161] | # (and %) of High School Students as CTE Concentrators in FY 2016[162] |
|---|---|---|---|---|---|
| Connecticut | $10,844,369 | 75% | 17 | 106,218 (71%) | 42,878 (29%) |
| Maryland | $17,951,226 | 65% | 27 | 103,538 (44%) | 23,885 (10%) |
| Massachusetts | $20,582,490 | 72% | 38 | 61,009 (24%) | 25,582 (10%) |
| Minnesota | $18,714,060 | 42% | 9 | 110,632 (45%) | 89,487 (37%) |
| New Jersey | $25,420,176 | 58% | 53 | 74,139 (20%) | 43,858 (12%) |
| New York | $56,867,904 | 52% | 21 | 190,988 (25%) | 102,873 (14%) |
| Pennsylvania | $44,426,542 | 70% | 84 | 63.847 (12%) | 32,479 (6.8%) |
| Rhode Island | $6,148,797 | 82% | 10 | 21,339 (56%) | 14,295 (37%) |

## Appendix B: 16 National Career Clusters, Descriptions, and Related Career Pathways[163,Q]

**1. Agriculture, Food, & Natural Resources:** The production, processing, marketing, distribution, financing, and development of agricultural commodities and resources including food, fuel, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

- Agribusiness Systems
- Animal Systems
- Environmental Service Systems
- Food Products & Processing Systems
- Natural Resources Systems
- Plant Systems
- Power, Structural, & Technical Systems

**2. Architecture & Construction:** Careers in designing, planning, managing, building, and maintaining the built environment.

- Construction
- Design/Pre-Construction
- Maintenance/Operations

**3. Arts, A/V Technology, & Communications:** Designing, producing, exhibiting, performing, writing, and publishing multimedia content, including visual and performing arts and design, journalism, and entertainment services.

- A/V Technology & Film
- Journalism & Broadcasting
- Performing Arts
- Printing Technology
- Telecommunications
- Visual Arts

**4. Business Management & Administration:** Careers in planning, organizing, directing, and evaluating business functions essential to efficient and productive business operations.

- Administrative Support
- Business Information Management
- General Management
- Human Resources Management
- Operations Management

**5. Education & Training:** Planning, managing, and providing education and training services, and related learning support services.

- Administration & Administrative Support
- Professional Support Services
- Teaching/Training

[Q] For additional information on occupations for each career cluster and pathway, visit https://careertech.org/career-clusters.

**6. Finance:** Planning, services for financial and investment planning, banking, insurance, and business financial management.

- Accounting
- Banking Services
- Business Finance
- Insurance
- Securities & Investments

**7. Government & Public Administration:** Planning and performing government functions at the local, state, and federal levels, including governance, national security, foreign service, planning, revenue and taxation, and regulations.

- Foreign Service
- Governance
- National Security
- Planning
- Public Management & Administration
- Regulation
- Revenue & Taxation

**8. Health Sciences:** Planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.

- Biotechnology Research & Development
- Diagnostic Services
- Health Informatics
- Support Services
- Therapeutic Services

**9. Hospitality & Tourism:** The management, marketing, and operations of restaurants and other food services, lodging, attractions, recreation events, and travel related services.

- Lodging
- Recreation, Amusements, & Attractions
- Restaurants & Food/Beverage Services
- Travel & Tourism

**10. Human Services:** Preparing individuals for employment in career pathways that relate to families and human needs such as counseling and mental health services, family and community services, personal care, and consumer services.

- Consumer Services
- Counseling & Mental Health Services
- Early Childhood Development & Services
- Family & Community Services
- Personal Care Services

**11. Information Technology:** Building linkages in IT occupations for entry level, technical and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

- Information Support & Services

- Network Systems
- Programming & Software Development
- Web & Digital Communications

**12. Law, Public Safety, Corrections, & Security:** Planning, managing, and providing legal, public safety, protective services, and homeland security, including professional and technical support services

- Correction Services
- Emergency & Fire Management Services
- Law Enforcement Services
- Legal Services
- Security & Protective Services

**13. Manufacturing:** Planning, managing, and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance, and manufacturing/process engineering.

- Health, Safety, & Environmental Assurance
- Logistics & Inventory Control
- Maintenance, Installation, & Repair
- Manufacturing Production Process Dev.
- Production
- Quality Assurance

**14. Marketing:** Planning, managing, and performing marketing activities to reach organizational objectives.

- Marketing Communications
- Marketing Management
- Marketing Research
- Merchandising
- Professional Sales

**15. Science, Technology, Engineering, & Mathematics:** Planning, managing, and providing scientific research and professional and technical services (e.g., physical science, social science, engineering), including laboratory and testing services, and research and development services.

- Engineering & Technology
- Science & Mathematics

**16. Transportation, Distribution & Logistics:** Planning, management, and movement of people, materials, and goods by road, pipeline, air, rail and water, and related professional support services such as transportation infrastructure planning and management, logistics services, mobile equipment, and facility maintenance.

- 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

## Appendix C: CTE Career Clusters from Selected States[R]

### Connecticut

Connecticut lists 12 clusters in its FY 2019 State CTE Plan:[164]

1. Agriculture, food, and natural resources
2. Architecture and construction
3. Business management and administration
4. Education and training
5. Finance
6. Health science
7. Hospitality and tourism
8. Information technology
9. Manufacturing
10. Marketing
11. Science, technology, engineering, and mathematics
12. Transportation, distribution, and logistics

These are slightly different than the clusters CTECS uses to organize its programs. CTECS adds 1) arts, audio/visual technology and communications and 2) human services. CTECS does not include 1) business management and administration, 2) education and training, or 3) finance.[165]

### Maryland

Maryland has 10 career clusters:[166]

1. Arts, Media, and Communication
2. Business Management and Finance
3. Construction and Development
4. Consumer Service, Hospitality, and Tourism
5. Environmental, Agricultural, and Natural Resources
6. Health and Biosciences
7. Human Resource Services
8. Information Technology
9. Manufacturing, Engineering Technology
10. Transportation Technologies

### Massachusetts

Massachusetts has 12 career clusters:[167]

1. Standardized Frameworks Strands (made up of four components: Safety and Health; Employability (Career Readiness); Management and Entrepreneurship; Technological)
2. Agriculture and Natural Resources Cluster
3. Arts and Communication Services Cluster
4. Business and Consumer Services Cluster
5. Construction Cluster
6. Education Cluster

[R] Rhode Island has not adopted uniform, state-approved career clusters.

7. Health Services Cluster
8. Hospitality and Tourism Cluster
9. Information Technology Services Cluster
10. Legal and Protective Services Cluster
11. Manufacturing, Engineering, and Technology Cluster
12. Transportation Cluster

**Minnesota**

Minnesota has 16 career clusters that are the same as the national clusters:[168]

1. Agriculture, Food, and Natural Resources
2. Architecture and Construction
3. Arts, Audio/Video Technology, and Communications
4. Business, Management, and Administration
5. Education and Training
6. Finance
7. Government and Public Administration
8. Health Science
9. Hospitality and Tourism
10. Human Services
11. Information Technology
12. Law, Public Safely, Corrections, and Security
13. Manufacturing
14. Marketing, Sales, and Service
15. Science, Technology, Engineering, and Mathematics
16. Transportation, Distribution, and Logistics.[169]

**New Jersey**

New Jersey has 16 career clusters that are the same as the national clusters:[170]

1. Agriculture, Food, and Natural Resources
2. Architecture and Construction
3. Arts, Audio/Video Technology, and Communications
4. Business Management and Administration
5. Education and Training
6. Finance
7. Government and Public Administration
8. Health Science
9. Hospitality and Tourism
10. Human Services
11. Information Technology
12. Law, Public Safety, Corrections, and Security
13. Manufacturing
14. Marketing
15. Science, Technology, Engineering, and Mathematics
16. Transportation, Distribution, and Logistics

## New York

New York has six CTE content areas that align with the national 16 clusters:[171]

1. Agricultural Education
2. Business and Marketing Education
3. Family and Consumer Sciences Education
4. Health Occupations Education
5. Technology Education
6. Trade, Technical, and Industrial Education

## Pennsylvania

Pennsylvania has 12 industry clusters:[172]

1. Advanced Manufacturing
2. Agriculture and Food Production
3. Bio-Medical
4. Building and Construction
5. Business Services
6. Education
7. Energy
8. Health Care
9. Hospitality, Leisure, and Entertainment
10. Logistics and Transportation
11. Real Estate, Finance, and Insurance
12. Wood, Wood Products, and Publishing

## Endnotes

[1] Levesque, K., Lauren, D., Teitelbaum, P., Alt, M., & Librera, S. (2000). *Vocational Education in the United States: Toward the Year 2000*. Washington, DC: U.S. Department of Education, National Center for Education Statistics. Retrieved from https://nces.ed.gov/pubs2000/2000029.pdf.
[2] Dougherty, S.M. (2016). *Career and Technical Education in High School: Does it Improve Student Outcomes?* Washington, DC: Thomas B. Fordham Institute. Retrieved from http://edex.s3-us-west-2.amazonaws.com/publication/pdfs/%282016.04.07%29%20Career%20and%20Technical%20Education%20in%20High%20School.pdf.
[3] Association for Career and Technical Education. (n.d.). Press FAQs on Career and Technical Education. Retrieved from https://www.acteonline.org/press-faqs-on-career-and-technical-education/.
[4] Advance CTE. (2018). *2018 Annual Report*. Silver Spring, MD: Author. Retrieved from https://cte.careertech.org/sites/default/files/AdvanceCTE_AnnualReport_2018.pdf.
[5] Carl D. Perkins Career and Technical Education Act of 2006, 20 U.S.C. § 2301 as amended by Consolidated Appropriations Act, 2019, Pub. L. No. 116-6.
[6] Carl D. Perkins Career and Technical Education Act of 2006, 20 U.S.C. § 2301 as amended by Consolidated Appropriations Act, 2019, Pub. L. No. 116-6 §§ 131-132.
[7] Carl D. Perkins Career and Technical Education Act of 2006, 20 U.S.C. § 2301 as amended by Consolidated Appropriations Act, 2019, Pub. L. No. 116-6 § 3.
[8] State plans as promulgated under Every Student Succeeds Act, Pub. L. No. 114-95.
[9] U.S. Department of Education, Office of Career, Technical, and Adult Education. (2018). *The Carl D. Perkins Career and Technical Education Act of 2006, as amended by the Strengthening Career and Technical Education for the 21st Century Act (Perkins V): Guide for the Submission of State Plans*. Washington, DC: Author. Retrieved from https://s3.amazonaws.com/PCRN/docs/1830-0029-Perkins_V_State_Plan_Guide-Expires_4-30-22.pdf.
[10] Workforce Innovation and Opportunity Act, Pub. L. No. 113-128.
[11] Castello, M., Stringfield, S., & Stone III, J.R. (2003). Secondary Career and Technical Education and Comprehensive School Reform: Implications for Research and Practice. *Review of Educational Research, 73*(2), 231-272. Available from https://doi.org/10.3102/00346543073002231.
[12] Carl D. Perkins Career and Technical Education Act of 2006, 20 U.S.C. § 2301 as amended by Consolidated Appropriations Act, 2019, Pub. L. No. 116-6 § 113.
[13] 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: Author. Retrieved from https://careertech.org/sites/default/files/State-CTE-Standards-ReportFINAL.pdf.
[14] Ibid.
[15] Imperatore, C., & Hyslop, A. (2017). Defining High-quality CTE: Quality CTE Program of Study Framework, Version 4.0 (Beta). Alexandria, VA: Association for Career and Technical Education. Retrieved from https://www.acteonline.org/wp-content/uploads/2018/02/ACTE-HighQualityCTEFramework-Draft4.0-Beta.pdf?utm_content=&utm_medium=email&utm_name=&utm_source=govdelivery&utm_term=.
[16] Ibid.
[17] 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: Author. Retrieved from https://careertech.org/sites/default/files/State-CTE-Standards-ReportFINAL.pdf.
[18] Ibid.
[19] Data retrieved from the Perkins Data Explorer funded by the U.S. Department of Education's Office of Career, Technical, and Adult Education. The Perkins Data Explorer is available at https://perkins.ed.gov/pims/DataExplorer.
[20] U.S. Department of Education, National Center for Education Statistics, Institute of Education Sciences. (2008). Table H1: Percentage of public high schools that are regular, career/technical, and other special focus, and various characteristics of each school type: 2008. *Schools and Staffing Survey (SASS), "Public School Questionnaire," 2007–08.* Washington, DC: Author. Retrieved from https://nces.ed.gov/surveys/ctes/tables/h01.asp.
[21] University of Connecticut, Office of Early College Programs, UConn Early College Experience. (n.d.). About Us. Retrieved from https://ece.uconn.edu/home/about/.
[22] Connecticut State Department of Education. (2018). *College Career Pathways: Guidelines for Connecticut Community Colleges and High Schools*. Hartford, CT: Author. Retrieved from https://portal.ct.gov/-/media/SDE/CTE/ct_ccp_guidelines.pdf?la=en.

[23] IBM. (n.d.). P-TECH: when skills meet opportunity, success happens. Retrieved from https://www.ibm.com/thought-leadership/ptech/index.html.
[24] Ibid.
[25] Foster, L. R., Klein, S., & Elliott, B. (2014). *State Strategies for Financing Career and Technical Education*. Washington, DC: U.S. Department of Education, Office of Career, Technical, and Adult Education. Retrieved from https://files.eric.ed.gov/fulltext/ED555236.pdf.
[26] Ibid.
[27] EdBuild. (2018). *FundEd: Career and Technical Education Funding Policies in Each State*. Jersey City, NJ: Author. Retrieved from http://funded.edbuild.org/reports/issue/cte/in-depth.
[28] Hill Regional Career Magnet School. (n.d.). About Us. Retrieved from https://www.careerhighschool.org/about-us.html.
[29] P-TECH. (n.d.). Our Schools: Connecticut, United States. Retrieved from http://www.ptech.org/p-tech-network/our-schools/ct/.
[30] Connecticut State Department of Education. (2019). *Connecticut Career and Technical Education Transition Year State Plan*. Hartford, CT: Author. Retrieved from https://portal.ct.gov/-/media/SDE/CTE/Posted-B-Program-Administration-and-Implementation-and-Fiscal-Responsibility.pdf.
[31] Connecticut State Department of Education. (n.d.). Connecticut Technical Education and Career System: Overview. Retrieved from https://portal.ct.gov/SDE/School-Choice/CT-School-Choice/Connecticut-Technical-Education-and-Career-System.
[32] New England Association of Schools and Colleges. (2016, June). The Increasing Demand for Career and Technical Education. Retrieved from https://cps.neasc.org/about/member-stories/demand-for-cte.
[33] Conn. Gen. Statutes ch. 164, § 19-95(b).
[34] Connecticut Technical Education and Career System. (n.d.). Career Technical Education Advisory Committee. Retrieved from http://www.cttech.org/about/career-technical-education-advisory-committee.html.
[35] Conn. Gen. Statutes ch. 164, § 10-95(c).
[36] Ibid.
[37] Conn. Acts 19-117.
[38] Conn. Gen. Statutes ch. 164, § 10-95s(a).
[39] Conn. Gen. Statutes ch. 164, §§ 10-64(a), 10-65(a).
[40] Conn. Agencies Regs. § 10-65-1.
[41] Conn. Agencies Regs. § 10-65-7.
[42] Connecticut State Department of Education. (2016). *Perkins FAQs*. Hartford, CT: Author. Retrieved from https://portal.ct.gov/-/media/SDE/CTE/perkins_frequently_asked_questions.pdf?la=en.
[43] Schneider, A. (2017). *Connecticut Early College Opportunities: P-TECH Grades 9-14 School Model* [PowerPoint slides]. Hartford, CT: State of Connecticut, Department of Labor. Retrieved from http://www.ctdol.state.ct.us/businessct2017/IBM%20PTECH.pdf.
[44] Moran, J.D. (2017). *Research Report: Technical High School Teachers and the Teachers' Retirement System (TRS)* (2017-R-0352). Hartford, CT: Connecticut General Assembly, Office of Legislative Research. Retrieved from https://www.cga.ct.gov/2017/rpt/pdf/2017-R-0352.pdf.
[45] Moran, J.D., & Bolger, A. (2018). *Comparison of Charter, Magnet, Agricultural Science Centers, and Technical High Schools* (2018-R-0030). Hartford, CT: Connecticut General Assembly, Office of Legislative Research. Retrieved from https://www.cga.ct.gov/2018/rpt/pdf/2018-R-0030.pdf.
[46] Conn. Gen. Statutes ch. 172, § 10-262f(22).
[47] Connecticut State Department of Education. (2019). *Connecticut Career and Technical Education Transition Year State Plan*. Hartford, CT: Author. Retrieved from https://portal.ct.gov/-/media/SDE/CTE/Posted-B-Program-Administration-and-Implementation-and-Fiscal-Responsibility.pdf.
[48] Connecticut School Finance Project. (2019). *Connecticut's Technical Education and Career System*. New Haven, CT: Author. Retrieved from http://ctschoolfinance.org/resources/uploads/files/Connecticuts-Technical-Education-and-Career-System.pdf.
[49] Maryland State Department of Education. (2019). *Maryland High School Career and Technology Education Programs of Study*. Baltimore, MD: Author. Retrieved from http://marylandpublicschools.org/programs/Documents/CTEProgramsStudy/CTEProgramsofStudy2019.pdf.
[50] Maryland State Department of Education. (2017). *Maryland High School Career and Technology Education Programs of Study, 7th Edition*. Baltimore, MD: Author. Retrieved from http://marylandpublicschools.org/programs/Documents/CTE/CTE%20Programs%20of%20Study/CTEBlueBook2017.pdf.

[51] Maryland State Department of Education, Division of Career and College Readiness. (2015). *Policies & Procedures for Development & Continuous Improvement of Career and Technology Education Programs of Study*. Baltimore, MD: Author. Retrieved from http://marylandpublicschools.org/programs/Documents/CTE/PoliciesProcedures072015.pdf.
[52] Maryland Commission on Innovation and Excellence in Education. (2019). *Interim Report*. Annapolis, MD: Author. Retrieved from http://dls.maryland.gov/pubs/prod/NoPblTabMtg/CmsnInnovEduc/2019-Interim-Report-of-the-Commission.pdf.
[53] Maryland State Department of Education. (n.d.). *Maryland Pathways in Technology Early College High Schools (P-TECH)*. Baltimore, MD: Author. Retrieved from http://www.marylandpublicschools.org/programs/Documents/ptech/P-TECHSnapshotCurrentEnrollment.pdf.
[54] Baltimore City Public Schools. (2019). *Middle and High School Choice Guide for 2019-20*. Baltimore, MD: Author. Retrieved from https://www.baltimorecityschools.org/sites/default/files/2019-01/choice-guide-201819.pdf.
[55] Md. Code Ann., Educ. § 21-101.
[56] Maryland State Department of Education, Division of Career and College Readiness. (2018). *Career and Technology Education (CTE) Local Advisory Council (LAC) and Program Advisory Council (PAC) Policies and Procedures*. Baltimore, MD: Author. Available from http://www.marylandpublicschools.org/programs/Documents/CTE/PerkinsIV/Resources/CTEAdvisoryGroups/CTE_LAC-PAC-Guidelines_Accessible.docx.
[57] Ibid.
[58] Maryland State Department of Education. (2018). *Preliminary DRAFT Calculations for Major State Aid Programs for Fiscal Year 2019*. Baltimore, MD: Author. Retrieved from http://www.marylandpublicschools.org/about/Documents/DBS/BudgetRes/2018/FY19StateAidPreliminaryDraftCalculations011918.pdf.
[59] Foster, L. R., Klein, S., & Elliott, B. (2014). *State Strategies for Financing Career and Technical Education*. Washington, DC: U.S. Department of Education, Office of Career, Technical, and Adult Education. Retrieved from https://files.eric.ed.gov/fulltext/ED555236.pdf.
[60] Maryland State Department of Education, Division of Career and College Readiness. (2018). *Request for Proposals: Fiscal Year 2019 Maryland Career and Technology Education Innovation Grant*. Baltimore, MD: Author. Retrieved from http://www.marylandpublicschools.org/about/Documents/Grants/RFP07282018/CTEInnovationGrantRFP.pdf.
[61] Maryland General Assembly, Department of Legislative Services. (2018). *House Bill 1415, Fiscal and Policy Note*. Annapolis, MD: Author. Retrieved from http://mgaleg.maryland.gov/2018RS/fnotes/bil_0005/hb1415.pdf.
[62] Maryland State Department of Education. (n.d.). *Pathways in Technology Early College High School (P-TECH) Frequently Asked Questions*. Baltimore, MD: Author. Retrieved from http://www.marylandpublicschools.org/programs/Documents/ptech/P-TechFAQ.pdf.
[63] Baltimore City Public Schools. (n.d.). Schools. Retrieved from https://www.baltimorecityschools.org/schools.
[64] Maryland State Department of Education. (n.d.). *Pathways in Technology Early College High School (P-TECH) Frequently Asked Questions*. Baltimore, MD: Author. Retrieved from http://www.marylandpublicschools.org/programs/Documents/ptech/P-TechFAQ.pdf.
[65] Maryland State Department of Education. (2017). *Technical Assistance Bulletin – April 2017: Providing Access and Equity to Students Interested in Career and Technology Education*. Baltimore, MD: Author. Available from http://www.marylandpublicschools.org/programs/Documents/CTE/PerkinsIV/Resources/CTEAdditionalResources/Technical-Assistance-Bulletin.docx.
[66] Massachusetts Department of Elementary and Secondary Education, Office for Career/Vocational Technical Education. (2017). *Chapter 74 Career/Vocational Technical Education Program Directory*. Malden, MA: Author. Available from http://www.doe.mass.edu/cte/programs/directory.html.
[67] Ibid.
[68] Massachusetts Department of Elementary and Secondary Education. (2018). *School Finance: Chapter 70 Program White Paper*. Malden, MA: Author. Available from http://www.doe.mass.edu/finance/chapter70/fy2019/chapter-19.html.
[69] Mass. Gen. Laws ch. 74, § 4.
[70] Mass. Gen. Laws ch. 74, § 3.
[71] Mass. Gen. Laws ch. 74, § 25.
[72] Mass. Gen. Laws ch. 74, § 24.
[73] Mass. Gen. Laws ch. 74, § 2.
[74] Mass. Gen. Laws ch. 74, § 6.

[75] Mass. Gen. Laws ch. 74, § 4.
[76] Mass. Gen. Laws ch. 74, § 26.
[77] Achieve, Inc. (2015). *Best of Both Worlds: How Massachusetts Vocational Schools Are Preparing Students for College and Careers*. Washington, DC: Author. Retrieved from https://www.achieve.org/files/Achieve_MAcareerTech.pdf.
[78] Massachusetts Department of Elementary and Secondary Education. (2018). *School Finance: Chapter 70 Program White Paper*. Malden, MA: Author. Available from http://www.doe.mass.edu/finance/chapter70/fy2019/chapter-19.html.
[79] Jones, C. (2016). *Skills for Our Future: Vocational Education in Masachusetts*. Boston, MA: Massachusetts Budget and Policy Center. Retrieved from http://www.massbudget.org/reports/pdf/Skills%20For%20Our%20Future.pdf.
[80] Mass. Gen. Laws ch. 74, § 7C.
[81] Ibid.
[82] Massachusetts Department of Elementary and Secondary Education. (2018). *School Finance: Chapter 70 Program White Paper*. Malden, MA: Author. Available from http://www.doe.mass.edu/finance/chapter70/fy2019/chapter-19.html.
[83] Mass. Gen. Laws ch. 74, § 8A.
[84] Mass. Gen. Laws ch. 74, § 31A.
[85] Mass. Gen. Laws ch. 74, §§ 28-29.
[86] Mass. Gen. Laws ch. 74, § 30.
[87] Massachusetts Department of Elementary and Secondary Education. (2010). *Chapter 74 Manual for Vocational Technical Education Admission Policies*. Malden, MA: Author. Retrieved from http://www.doe.mass.edu/cte/admissions/policies_manual.pdf.
[88] Mass. Gen. Laws ch. 74, §§ 32-33.
[89] Achieve, Inc. (2015). *Best of Both Worlds: How Massachusetts Vocational Schools Are Preparing Students for College and Careers*. Washington, DC: Author. Retrieved from https://www.achieve.org/files/Achieve_MAcareerTech.pdf.
[90] Jones, C. (2016). *Skills for Our Future: Vocational Education in Masachusetts*. Boston, MA: Massachusetts Budget and Policy Center. Retrieved from http://www.massbudget.org/reports/pdf/Skills%20For%20Our%20Future.pdf.
[91] Minnesota State Colleges and Universities, & Minnesota Department of Education. (2016). *Minnesota Five-Year State CTE Plan: July 1, 2008 to June 30, 2013*. St. Paul, MN: Minnesota State Colleges and Universities. Retrieved from http://www.minnstate.edu/system/cte/MN_State_Plan/documents/Carl-D-Perkins-State-Plan-3-31-2016-submission.pdf.
[92] Minnesota Department of Education. (n.d.). Career and Technical Education: Program Approval. Retrieved from https://education.mn.gov/MDE/dse/cte/progApp/index.htm.
[93] Minnesota State Colleges and Universities, & Minnesota Department of Education. (2014). *Consolidated Annual Report (CAR) 2014*. St. Paul, MN: Minnesota State Colleges and Universities. Retrieved from https://www.minnstate.edu/system/cte/MN_State_Plan/documents/MN2014-CAR-Report-comprehensive1.pdf.
[94] Minn. Stat. § 124D.4531.
[95] Ibid.
[96] Ibid.
[97] Minnesota Department of Education. (n.d.). Career and Technical Education Levy Web-Based Reporting System. Retrieved from https://education.mn.gov/MDE/dse/datasub/CTELevyReportSys/.
[98] Minnesota House of Representatives, Department of Fiscal Analysis. (2017). *Financing Education In Minnesota, 2017-18*. St. Paul, MN: Author. Available from https://www.house.leg.state.mn.us/Fiscal/Download/2020.
[99] Minnesota House of Representatives, Research Department. (2018). *Minnesota School Finance: A Guide for Legislators*. St. Paul, MN: Author. Retrieved from https://www.house.leg.state.mn.us/hrd/pubs/mnschfin.pdf.
[100] Minn. Stat. § 124D.03.
[101] Minn. Stat. § 120B.125.
[102] Advance CTE. (n.d.). New Jersey. Retrieved from https://careertech.org/New-Jersey.
[103] New Jersery Council of County Vocational-Technical Schools. (n.d.). About the Council. Retrieved from https://www.careertechnj.org/about/about-the-council/.
[104] New Jersery Council of County Vocational-Technical Schools. (n.d.). For Students and Parents. Retrieved from https://www.careertechnj.org/for-students-and-parents/.

[105] State of New Jersey, Department of Education. (n.d.). Career Clusters. Retrieved from https://www.nj.gov/education/cte/career/.
[106] State of New Jersey, Office of the Governor. (2018, November 27). *Governor Murphy Announces P-TECH Education Model for New Jersey* [Press release]. Retrieved from https://www.nj.gov/governor/news/news/562018/approved/20181127b.shtml.
[107] State of New Jersey, Department of Education. (n.d.). Office of Career Readiness. Retrieved from https://www.nj.gov/education/cte/.
[108] Ibid.
[109] State of New Jersey, Department of Education. (2019). *Educational Adequacy Report*. Trenton, NJ: Author. Retrieved from https://www.nj.gov/education/stateaid/1920/EARFY20.pdf.
[110] State of New Jersey, Department of Education, Office of Career Readiness. (2018). *Preliminary FY19 Secondary Perkins Allocation to Schol Districts As of May 30, 2018*. Trenton, NJ: Author. Retrieved from https://www.nj.gov/education/cte/perkins/secondary/allocations.pdf.
[111] N.J. Rev. Stat. § 18A:54-20.1.
[112] N.J. Rev. Stat. § 23A-17.3.
[113] New Jersery Council of County Vocational-Technical Schools. (n.d.). For Students and Parents. Retrieved from https://www.careertechnj.org/for-students-and-parents/.
[114] Smarick, A. (2017). *The Evolving High School CTE: New Jersey's Distinctive Approach to Career Education*. Washington, DC: American Enterprise Institute. Retrieved from http://www.aei.org/publication/the-evolving-high-school-cte-new-jerseys-distinctive-approach-to-career-education/.
[115] New York State Education Department. (n.d.). *New York State Five-Year CTE Perkins IV Plan*. Albany, NY: Author. Retrieved from https://cte.careertech.org/sites/default/files/NewYork5YearStatePlan.pdf.
[116] New York State Education Department. (n.d.). Advancing New York State Career & Technical Education: Quality, Access, Delivery. Retrieved from http://www.p12.nysed.gov/cte/home.html.
[117] New York State Education Department. (2015, October). Part 100 Regulations: 100.2 General School Requirements. Retrieved from http://www.p12.nysed.gov/part100/pages/1002.html#h.
[118] Boards of Cooperative Educational Services of New York State. (n.d.). About BOCES. Retrieved from https://www.boces.org/about-boces/.
[119] Ibid.
[120] Ibid.
[121] New York State Education Department, Career and Technical Education. (2011, March 10). Program Approval Process FAQ. Retrieved from http://www.p12.nysed.gov/cte/ctepolicy/qanda.htm.
[122] New York State Education Department, Career and Technical Education. (2016, July 19). CTE Technical Assistance Center of NY. Retrieved from http://www.p12.nysed.gov/cte/CTETAC/home.html.
[123] The University of the State of New York, & New York State Education Department, Office of State Aid. (2018). *2018-19 State Aid Handbook: Formula Aids and Entitlements for Schools in New York State as Amended by Chapters of the Laws of 2018*. Albany, NY: New York State Education Department. Retrieved from https://stateaid.nysed.gov/publications/handbooks/handbook_2018.pdf.
[124] New York State School Boards of Educaiton. (n.d.). BOCES Fact Sheet. Retrieved from https://www.nyssba.org/about-nyssba/boces-fact-sheet/.
[125] The University of the State of New York, & New York State Education Department, Office of State Aid. (2018). *2018-19 State Aid Handbook: Formula Aids and Entitlements for Schools in New York State as Amended by Chapters of the Laws of 2018*. Albany, NY: New York State Education Department. Retrieved from https://stateaid.nysed.gov/publications/handbooks/handbook_2018.pdf.
[126] Ibid.
[127] P-TECH NYC. (n.d.). General Information. Retrieved from https://www.ptechnyc.org/domain/23.
[128] State of New York, Office of the Governor. (2018, May 2). *Governor Cuomo Announces Winners of New York State P-TECH Awards* [Press release]. Retrieved from https://www.governor.ny.gov/news/governor-cuomo-announces-winners-new-york-state-p-tech-awards.
[129] New York State Education Department. (n.d.). Pathways in Technology (NYS P-TECH) Program. Retrieved from http://www.nysed.gov/postsecondary-services/pathways-technology-nys-p-tech-program.
[130] New York State Education Department. (2019, March 27). Announcement of Funding Opportunity, RFP #: GC19-007 – 2019-2026 NYS Pathways in Technology Early College High School (NYS P-TECH) Program. Retrieved from http://www.p12.nysed.gov/funding/nysed-rfp-gc19-007-ptech/home.html.
[131] Jacoby, T., & Dougherty, S.M. (2016). *The New CTE: New York City as Laboratory for America*. New York, NY: Manhattan Institute for Policy Research, Inc. Retrieved from https://media4.manhattan-institute.org/sites/default/files/R-TJSD-0316.pdf.

[132] Pennsylvania Department of Education. (2019). *Pennsylvania Career & Technical Education: College and Career Pathways for the 21st Century*. Harrisburg, PA: Author. Retrieved from https://www.education.pa.gov/Documents/K-12/Career%20and%20Technical%20Education/PA%20CTE%202019%20Brochure.pdf.
[133] Ibid.
[134] Ibid.
[135] Ibid.
[136] Pennsylvania Department of Education. (n.d.). Career and Technical Education, Administrative Resources. Retrieved from https://www.education.pa.gov/K-12/Career%20and%20Technical%20Education/Pages/Administrative-Resources.aspx.
[137] Jobs for the Future. (2005). Career and Technical Education In Pennsylvania: Opportunities for Commonwealth Policy. Boston, MA: Author. Retrieved from https://www.education.pa.gov/Documents/K-12/Career%20and%20Technical%20Education/Perkins/Jobs%20for%20the%20Future%20Report.pdf.
[138] Pennsylvania Department of Education. (2018). Career and Technical Education Competitive Equipment Grant Guidelines. Harrisburg, PA: Author. Retrieved from https://www.education.pa.gov/Documents/K-12/Career%20and%20Technical%20Education/Grants/CTE%20Equipment%20Grant%20Guidelines.pdf.
[139] Pennsylvania Department of Education. (2019). *Pennsylvania Career & Technical Education: College and Career Pathways for the 21st Century*. Harrisburg, PA: Author. Retrieved from https://www.education.pa.gov/Documents/K-12/Career%20and%20Technical%20Education/PA%20CTE%202019%20Brochure.pdf.
[140] Pennsylvania Public School Code of 1948, § 2502.8.
[141] Pennsylvania Depatrment of Education. (n.d.). Secondary Career and Technical Education Subsidy. Retrieved from https://www.education.pa.gov/Teachers%20-%20Administrators/School%20Finances/Education%20Budget/Pages/Secondary-Career-and-Technical-Education-Subsidy.aspx#tab-1).
[142] 22 Pa. Code § 4.23(d)(1).
[143] Pennsylvania Department of Education. (n.d.). Student Access to Career and Technical Education. Retrieved from https://www.education.pa.gov/K-12/Career%20and%20Technical%20Education/Pages/Student-Access.aspx.
[144] Pennsylvania Department of Education. (2019). *Pennsylvania Career & Technical Education: College and Career Pathways for the 21st Century*. Harrisburg, PA: Author. Retrieved from https://www.education.pa.gov/Documents/K-12/Career%20and%20Technical%20Education/PA%20CTE%202019%20Brochure.pdf.
[145] William M. Davies, Jr. Career and Technical High School. (n.d.). About Davies Career & Tech. Retrieved from https://www.daviestech.org/domain/27.
[146] Advance CTE. (n.d.). Rhode Island. Retrieved from https://careertech.org/Rhode-Island.
[147] Rhode Island Department of Education. (2018). *RIDE Approved CTE Programs as of July 1, 2018*. Providence, RI: Author.. Retrieved from http://www.ride.ri.gov/Portals/0/Uploads/Documents/Students-and-Families-Great-Schools/Educational-Programming/Career-and-Tech/2018-19ProgramApproval/Approved_CTE_Programs_AY_2017.2018_ptm.pdf.
[148] 200 R.I. Code R. § 10-3.2.
[149] 16 R.I. Gen. Laws § 16-7.2-6.
[150] Wagner, K. (2018). *Funding Formula Reference Guide*. Providence, RI: Rhode Island Department of Education. Retrieved from https://www.ride.ri.gov/Portals/0/Uploads/Documents/Funding-and-Finance-Wise-Investments/Funding-Sources/State-Education-Aid-Funding-Formula/Guide%20with%20flow%20charts%204.13.2018.pdf.
[151] 16 R.I. Gen. Laws § 16-7.2-6.
[152] Ibid.
[153] Wagner, K. (2018). *Funding Formula Reference Guide*. Providence, RI: Rhode Island Department of Education. Retrieved from https://www.ride.ri.gov/Portals/0/Uploads/Documents/Funding-and-Finance-Wise-Investments/Funding-Sources/State-Education-Aid-Funding-Formula/Guide%20with%20flow%20charts%204.13.2018.pdf.
[154] PrepareRI. (2019). *2019 Annual Report Overview*. Rhode Island: Author. Retrieved from https://static1.squarespace.com/static/59a81489579fb39e3ef2232f/t/5ad641e2f950b79e97da233d/1523991011810/PrepareRI+Two-Pager+2018.04.pdf.
[155] PrepareRI. (2019). *2019 Annual Report*. Rhode Island: Author. Retrieved from https://static1.squarespace.com/static/59a81489579fb39e3ef2232f/t/5cb887cc53450a986d9517b6/1555597261263/2019+PrepareRI+Annual+Report_updates-compressed.pdf.

[156] William M. Davies, Jr. Career and Technical High School. (n.d.). Davies Admissions Process. Retrieved from https://www.daviestech.org/Page/88.
[157] Metropolitan Regional Center And Technical Center. (n.d.). Apply to the Met. Retrieved from https://www.themethighschool.org/apps/pages/index.jsp?uREC_ID=376964&type=d&pREC_ID=852629.
[158] Miller, S.L. (2019). *Memorandum to State Directors of Career and Technical Education RE: Estimated Fiscal Year (FY) 2019 State Allocations under the Carl D. Perkins Career and Technical Education Act of 2006, as amended by the Strengthening Career and Technical Education for the 21st Century Act (Perkins V)*. Washington, DC: U.S. Department of Education, Office of Career, Technical, and Adult Education. Retrieved from https://s3.amazonaws.com/PCRN/docs/FY_2019_Allocations_Memo.pdf.
[159] Data compiled from Advance CTE and resources located at:
Advance CTE. (n.d.). State Profile Resources & Data. Retrieved from https://careertech.org/state-profile-resources-data.
[160] Ibid.
[161] Numbers available from Advance CTE. Percentages calculated by the Connecticut School Finance Project.
[162] Ibid.
[163] Advance CTE. (n.d.). *Career Clusters*. Silver Spring, MD: Author. Retrieved from https://cte.careertech.org/sites/default/files/CareerClustersPathways.pdf.
[164] Connecticut State Department of Education. (2019). *Connecticut Career and Technical Education Transition Year State Plan*. Hartford, CT: Author. Retrieved from https://portal.ct.gov/-/media/SDE/CTE/Posted-B-Program-Administration-and-Implementation-and-Fiscal-Responsibility.pdf.
[165] Connecticut Technical Education and Career System. (n.d.). Career and Technical Education. Retrieved from http://www.cttech.org/programs/career-technical-education.html.
[166] Maryland State Department of Education. (2019). *Maryland Career and Technology Education (CTE) Transition Year State Plan* [PowerPoint slides]. Baltimore, MD: Author. Retrieved from http://marylandpublicschools.org/stateboard/Documents/03262019/TabM-CTE.pdf.
[167] Massachusetts Department of Elementary and Secondary Education, Office for Career/Vocational Technical Education. (2019, March 1). Vocational Technical Education Frameworks. Retrieved from http://www.doe.mass.edu/cte/frameworks/?section=all.
[168] Minnesota State Colleges and Universities. (n.d.). About Career Clusters. Retrieved from https://careerwise.minnstate.edu/careers/aboutclusters.html.
[169] Minnesota State Colleges and Universities, & Minnesota Department of Education. (2016). *Minnesota Five-Year State CTE Plan: July 1, 2008 to June 30, 2013*. St. Paul, MN: Minnesota State Colleges and Universities. Retrieved from http://www.minnstate.edu/system/cte/MN_State_Plan/documents/Carl-D-Perkins-State-Plan-3-31-2016-submission.pdf.
[170] State of New Jersey, Department of Education. (n.d.). Career Clusters. Retrieved from https://www.nj.gov/education/cte/career/.
[171] The University of the State of New York, & New York State Education Department, Office of Career and Technical Education. (2018). *New York State Career and Techincal Education: Guidelines for Career and Technical Education Administrators and School Counselors*. Albany, NY: New York State Education Department, Office of Career and Technical Education. Retrieved from http://www.p12.nysed.gov/cte/policy/docs/CTEadminguide070618_508.pdf.
[172] Commonwealth of Pennsylvania, Deparment of Labor and Industry, Center for Workforce Information and Analysis. (n.d.). Industry Clusters. Retrieved from https://www.workstats.dli.pa.gov/Products/PAIndustryClusters/Pages/default.aspx.