NACTE
National Assessment of
Career and Technical Education

U.S. DEPARTMENT OF EDUCATION

National Assessment of Career and Technical Education

FINAL REPORT TO CONGRESS

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National Assessment of Career and Technical Education

Final Report

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U.S. Department of Education
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Executive Summary

Economic globalization and technological innovations are redefining the knowledge and skill expectations for 21st century workers (Carnevale and Rose 2011; Friedman 2005). Policymakers and educators are responding by emphasizing the preparation of high school students for college **and** careers — both options, not just one or the other — with the understanding that all youth will require some form of advanced education or skill training if they are to compete in today's labor market. Career and technical education (CTE) coursework at the postsecondary level offers students more specialized instruction — academic as well as technical — that culminates in the award of a certificate or degree that will help them secure employment or pursue further education.

The *Carl D. Perkins Career and Technical Education Act of 2006* (*Perkins IV*) continues a longstanding federal investment in CTE through grants to states and subgrants to local entities such as local education agencies (LEAs) and institutions of higher education (IHEs).[1] As the fourth reauthorization of a law first enacted in 1984, *Perkins IV* was intended to raise the academic and technical rigor of secondary and postsecondary CTE instruction in order to prepare students for entry into high-skill, high-wage, or high-demand occupations. Under *Perkins IV*, subgrantees are now required to offer one or more programs of study (POS) that link secondary to postsecondary education through a sequenced, non-duplicative progression of CTE courses. Changes in *Perkins* accountability provisions expanded performance reporting requirements and extended accountability requirements to local subgrantees.

This final report of the National Assessment of Career and Technical Education (NACTE) summarizes the most recent available data on the implementation of *Perkins IV*, as well as student participation and outcomes for CTE more generally. The report uses information from studies commissioned for the NACTE, reviews of existing research, and analyses of extant data from state performance reports and from the National Center for Education Statistics (NCES). Topics include student participation in CTE programs at the secondary and postsecondary levels, changes in *Perkins* funding levels and targeting, implementation of *Perkins IV* provisions regarding POS and accountability, and educational and employment outcomes for CTE students.

Changes Introduced in *Perkins IV*

Perhaps the most immediately apparent change in *Perkins IV* is its name change, from *Vocational and Applied Technology Education Act* to *Career and Technical Education Act*. This change follows a movement in the field to use the term "career and technical education" to differentiate the mission

[1] Local secondary subgrantees may include LEAs, area CTE centers, educational service agencies, and consortia of eligible agencies. Local postsecondary subgrantees may include public or private nonprofit IHEs, LEAs and area CTE centers that provide CTE at the postsecondary level, postsecondary institutions controlled by the Bureau of Indian Affairs or operated by or on behalf of an eligible Indian tribe, educational service agencies, and consortia of eligible entities. Because LEAs account for nearly all secondary subgrantees (98 percent in FY 2010), and IHEs account for the large majority (86 percent) of postsecondary subgrantees (and 96 percent of postsecondary subgrant funds), this report sometimes uses the terms "LEA" and "IHE" to refer to local secondary and postsecondary subgrantees.

of contemporary career-focused education from that of the past. *Perkins IV* defines CTE as a sequence of courses that, among other things, provides individuals with coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers; provides technical skill proficiency, an industry-recognized credential, a certificate, or an associate degree; and includes competency-based applied learning that contributes to academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, employability skills, technical skills, occupation-specific skills, and knowledge of all aspects of an industry.[2]

Key programmatic changes in *Perkins IV* include the following:

- ***Changes to accountability indicators*** — *Perkins IV* introduced separate indicators for secondary and postsecondary education, added two secondary indicators aligned with requirements under the *Elementary and Secondary Education Act of 1965, as amended (ESEA)*, and required reporting of disaggregated data to include the same subgroups as are used for *ESEA* reporting, in addition to the "special populations" that are specifically listed in the *Perkins* statute.

- ***Extension of performance accountability to the local level*** — LEAs, IHEs, and other subgrantees must now negotiate performance targets for each indicator with their state eligible agency. A subgrantee whose actual performance is below 90 percent of any of its negotiated targets must develop a program improvement plan and may face increasing sanctions if its performance does not improve.

- ***Introduction of POS*** — All local *Perkins IV* subgrant recipients must now offer one or more POS that consist of a sequenced, non-duplicative progression of CTE courses that are designed to connect secondary and postsecondary curricula and to lead to an industry-recognized credential or certificate at the postsecondary level or an associate's or bachelor's degree. A POS must include rigorous content aligned with challenging academic standards and relevant technical content. Where appropriate, secondary students may earn college credit while still enrolled in high school.

- ***Tech Prep*** — *Perkins IV* gave states the option to consolidate all or a portion of their *Perkins* Title II (Tech Prep) allocations into their *Perkins* Title I basic grant. Subsequently, in April 2011, Congress eliminated funding for Tech Prep, and the program has not been funded since that time. Tech Prep has essentially been replaced by the POS approach to linking high school and postsecondary CTE curricula. This report provides limited coverage of this discontinued program.

- ***Finance*** — *Perkins IV* made few changes to provisions concerning the allocation and use of *Perkins* funds. Aside from the new option to consolidate Tech Prep funds with Title I funds (discussed above), change in fiscal provisions were relatively minor.

The National Assessment of Career and Technical Education

Perkins IV mandated an independent evaluation and assessment of CTE programs, including the implementation of new and revised requirements enacted in the 2006 reauthorization. This final

[2] See Exhibit 1.1 for the complete *Perkins IV* definition of CTE.

report provides a comprehensive summary of key findings from the NACTE, using information from a study of *Perkins* implementation, commissioned studies of CTE student outcomes, reviews of existing research, and analyses of extant data to examine how states and local subgrantees, such as LEAs and IHEs, are responding to key provisions of *Perkins IV*. The report examines student participation in CTE programs at the secondary and postsecondary levels, changes in funding levels and targeting, implementation of *Perkins IV* provisions regarding accountability and POS, and achievement and employment outcomes for CTE students.

The NACTE was designed to examine the following research questions:

- Has student participation in CTE programs changed?
- How were *Perkins IV* funds allocated and used?
- How were states and local subgrantees developing and implementing programs of study that integrate academic and technical content across secondary and postsecondary education?
- How were states implementing *Perkins IV* accountability provisions, and what measurement issues affect the validity and reliability of the accountability data that were reported?
- Are educational and employment outcomes showing positive results for secondary and postsecondary students who participated in CTE?

Independent Advisory Panel

The Congressional mandate for the NACTE included a requirement to form an Independent Advisory Panel to advise the U.S. Department of Education on the design and implementation of the NACTE. The Department assembled a panel of 13 members including researchers with expertise in CTE and research methods, education and workforce development policy experts, and state and local practitioners, and the panel provided input on study plans and draft reports through a series of seven meetings held in Washington, D.C. The panel also prepared its own independent report with its findings and recommendations to Congress.

Data Sources Included in the NACTE

The NACTE synthesizes data collected from a variety of sources, including a study of *Perkins IV* implementation, commissioned studies of CTE student outcomes, reviews of existing research, and analyses of extant data. Key data sources are summarized briefly below and described in more detail in Appendix B:

- **Evaluation of the Implementation of the *Carl D. Perkins Career and Technical Education Act of 2006*.** This study, commissioned for the NACTE, conducted surveys, case studies, and analyses of extant data to provide information on the implementation of *Perkins IV* provisions for finance, accountability, and programs of study. The study surveyed state directors responsible for overseeing *Perkins* implementation at the secondary and postsecondary levels in the 50 states and the District of Columbia, as well as local program

directors in a stratified random sample of 2,041 LEAs and area CTE centers[3] and 1,006 IHEs. Surveys were administered in fall 2009, and response rates were 100 percent for state secondary directors, 94 percent for state postsecondary directors, 77 percent for LEAs and CTE centers, and 91 percent for IHEs. Case studies were conducted in six states and 18 local communities (three per state), including site visits and in-depth interviews.

- **Commissioned studies of CTE student outcomes.** Four independent studies, based on different data sources and methodological approaches, used longitudinal student-level data to examine outcomes related to high school students' participation in CTE. These studies primarily examined CTE students who were enrolled in high school during the period prior to the implementation of *Perkins IV*; this approach was chosen in order to follow students over a longer period of time than was possible for *Perkins IV* at the time these studies were initiated.

  A study of Philadelphia CTE high schools took advantage of a natural experiment involving a lottery to select student applicants to attend CTE high schools, following students from the classes of 2003, 2004, and 2005 to examine both secondary and postsecondary student outcomes. A San Diego study used a fixed-effects model to examine the association between student CTE coursetaking and academic outcomes, following eight cohorts of high school students who entered ninth grade between1998 to 2006. A Florida study analyzed individual secondary and postsecondary student records that followed students who were in ninth grade in 1996 for 10 years, through 2007. Finally, an analysis of data from the NCES Education Longitudinal Study (ELS) used a fixed-effects model and data from a nationally representative longitudinal study of 2002 high school sophomores to examine the associations between CTE coursetaking and high school outcomes.

- **Analyses of extant data.** The NACTE also drew upon existing data from a variety of sources, including annual state performance reports as well as NCES longitudinal and cross-sectional studies. The NCES datasets used included the Education Longitudinal Study, National Assessment of Educational Progress (NAEP) and the associated High School Transcript Study (HSTS), Schools and Staffing Survey (SASS), Integrated Postsecondary Education Data System (IPEDS), National Postsecondary Student Aid Study (NPSAS), and Beginning Postsecondary Students Longitudinal Study (BPS).

Definitions of Terms Used in This Report

Although *Perkins IV* provides a broad statutory definition of the term "career and technical education," it does not identify specific subjects or fields that are to be considered as CTE; rather, grantees and subgrantees design and implement CTE courses and course sequences that they support through *Perkins* funds (as well as through other funding sources). For analytic purposes, NCES has developed taxonomies for classifying certain fields of study as CTE at the secondary and postsecondary level[4] (see Chapter 1); however, the NCES taxonomies are not necessarily the same as are used by secondary and postsecondary subgrantees at the local level.

[3] The sample for this survey included 2,993 LEAs and 48 area CTE centers. This report, for brevity, uses the term "LEA directors" when presenting findings from this survey.

[4] Bradby and Hudson (2007), *The 2007 Revision of the Career/Technical Education Portion of the Secondary School Taxonomy*.

This report uses the following broad definitions of secondary and postsecondary CTE:

- ***Secondary CTE:*** At the secondary level, occupational CTE is coursework designed to prepare students for work in a specific occupational field or for related postsecondary education or training, while non-occupational CTE is coursework that prepares students for roles outside the paid labor market and instruction in generic employment skills such as basic computer literacy, introduction to technology, and general work experience. Analyses in this report focus primarily on occupational CTE.

- ***Postsecondary CTE:*** At the postsecondary level, CTE is undergraduate instruction that is designed to prepare students to enter specific occupations or careers. Perkins postsecondary funds generally support CTE activities and programs at the subbaccalaureate level, and most of the information in this report on postsecondary CTE participation and outcomes is focused on subbaccalaureate programs and students.

At both the secondary and postsecondary levels, the terms "participant" and "concentrator" are used to differentiate between CTE students who may have earned only one CTE credit and those who earned a larger number of credits in a single CTE field. The definitions used for *Perkins IV* reporting purposes are established by states and thus may vary across states, as well as differing from the definitions used in NCES datasets or by other researchers.

In this report, definitions of the terms CTE "student," "participant," and "concentrator" vary depending on the data source. When examining performance indicator data submitted by states for accountability purposes (i.e., in Chapter 5), we use the indicator data submitted by states, which are based on the definitions of participant and concentrator chosen by each state. However, when analyzing data from NCES datasets and certain other sources, this report follows the common research practice of using definitions that are consistent across jurisdictions, in order to provide analyses of CTE participation and outcomes that are comparable across states and the nation. At the postsecondary level, CTE students are generally considered to be students who are seeking a subbaccalaureate credential (i.e., a certificate or associate's degree) in a CTE field, based on their major or field of study. At the secondary level, we use the following definitions:

- ***Participant:*** A secondary student earning at least one credit in occupational CTE courses.

- ***Concentrator:*** A secondary student earning three or more credits within a single CTE occupational area.

- ***Non-concentrator:*** A secondary student who had not earned sufficient CTE credits to meet the concentrator definition in the preceding bullet; these include students who earned no CTE credits as well as those who earned some CTE credits but not enough to meet the definition of a concentrator.

Study Limitations

This report has three main limitations. First, the most recent data for many of the data sources included in this report were for years when key provisions of *Perkins IV* were still in the early stages of implementation, and many individuals in the studies had had limited, if any, exposure to changes enacted in *Perkins IV*. A second limitation is that the NCES datasets that were used for analyses of CTE student participation and outcomes do not always use consistent definitions for CTE fields or

concentrators, and the three-credit definition for CTE concentrators used to conduct consistent analyses across states is different from the definitions adopted by many states. Finally, the NACTE was not able to examine the effects or effectiveness of *Perkins IV* and instead provides information on implementation of the *Perkins IV* provisions and on student participation and outcomes related to CTE in general.

Despite these limitations, the information presented in this report represents the most current and comprehensive assessment of how states and local subgrantees are responding to the provisions of *Perkins IV* and the challenges they face in designing, implementing, and administering CTE programs.

Key Findings

CTE Programs and Participation

- Nearly all public high school students (95 percent of ninth-grade students in 2009) attended a school that offered CTE instruction, either on campus or at a partnering school. In 2009, 85 percent of public high school graduates had completed one or more occupational CTE courses, 76 percent had earned at least one full credit in occupational CTE, and 19 percent were CTE concentrators who had earned at least three credits in the same CTE field.
    - The most common occupational CTE subject areas for secondary students were business (33 percent of high school graduates), communications and design (30 percent), and computer and information sciences (21 percent).
- Secondary occupational CTE coursetaking declined slightly from 1990 to 2009, while academic coursetaking increased. However, some CTE occupational areas saw large increases in secondary coursetaking from 1990 to 2009, including health sciences (+222 percent) and public services (+153 percent), while large declines in coursetaking occurred in other areas such as manufacturing (–42 percent) and business (–37 percent).
- In 2011–12, secondary teachers who taught occupational CTE were less likely to have a bachelor's or master's degree than were academic teachers. However, CTE teachers reported receiving more hours of professional development in that year than did academic teachers.
- At the postsecondary level, 2-year institutions accounted for two-fifths of all institutions offering CTE subbaccalaureate credentials but over three-fourths of undergraduate students who were seeking such credentials.
- More than 8 million students were seeking a subbaccalaureate certificate or degree in a CTE field in 2011–12. Over half of these postsecondary CTE students were in the fields of health sciences (36 percent) or business (17 percent).
- The number of students earning subbaccalaureate credentials in CTE fields rose 71 percent from 2002 to 2012, compared with a 54 percent increase in all undergraduate awards.
    - Some CTE fields showed even greater rates of growth in certificates and associate's degrees (e.g., a 137 percent increase for health sciences), while others showed declines (e.g., a 44 percent decline for marketing).

- Certificate seekers tended to be older than students seeking a bachelor's degree and were more likely to be from a lower-income stratum.

Finance

- Federal appropriations for *Perkins IV* have fallen since the 2006 reauthorization. Adjusting for inflation, total Perkins funding declined by 24 percent from FY 2007 to FY 2014. Declines in allocations for individual states ranged from 6 to 30 percent.
    - Over the longer term, from FY 1985 to FY 2014, the decline in Perkins funding amounted to a 32 percent reduction in purchasing power, while total discretionary funding for federal elementary-secondary programs and postsecondary programs more than doubled (with increases of 153 and 133 percent, respectively).
- An increasing number of states are using the reserve option to provide additional funding to subgrantees in rural areas or those serving high numbers or percentages of CTE students, rising from 24 states in FY 2006 to 41 states in FY 2010.
- In FY 2010, states allocated 64 percent of their *Perkins* Title I subgrant funds to secondary school programs and 36 percent to postsecondary programs, on average, about the same proportions as in FY 2001. However, states varied widely in the share of funds they allocated to secondary school programs, ranging from 38 percent in California to 88 percent in Ohio.
    - High-poverty school districts received larger allocations per secondary student in 2009–10 than lower-poverty districts. However, they received smaller allocations per poor school-age child (ages 5–17) than lower-poverty school districts.
    - School districts located in cities received larger allocations per secondary student than those located in suburbs, towns, and rural areas. However, school districts in towns and rural areas received larger allocations per poor school-age child than urban and suburban districts.
    - Over three-fourths (77 percent) of Perkins postsecondary funds were allocated to public 2-year institutions.
- Almost two-thirds of all states reported funding consortia at the secondary level; states less frequently reported providing waivers of the minimum allocation rule. Both consortia and waivers were less common at the postsecondary level than at the secondary level.
    - The number of subgrantees participating in consortia varied widely across states, ranging from two to 554 at the secondary level and from two to 50 at the postsecondary level.
    - States were most likely to waive the minimum allocation rule for LEAs serving sparsely populated areas.
- In 2008–09, subgrantees most frequently reported using *Perkins* funds for equipment and to provide career guidance and academic counseling to students.

Programs of Study

- Statutory provisions allow states and local subgrantees considerable flexibility in designing and implementing POS. This flexibility has led to variation — both across and within states — in how CTE practitioners design programs and work to build linkages between secondary and postsecondary education.

- Based on surveys conducted in 2009, states tended to play a larger role in developing POS at the secondary level than at the postsecondary level, where IHEs were more likely to take the lead.

    - Taking into account states that either developed POS and/or provided guidance for locally-developed POS, a total of 40 states participated in POS development at the secondary level, and 24 did so at the postsecondary level.

    - At the local level, LEA CTE directors reported that secondary CTE teachers and LEA administrators were the groups most involved in POS development, while IHE CTE directors reported that postsecondary CTE faculty and administrators were the most involved.

- Reports from both state and local CTE directors indicated incomplete compliance, as of the 2008–09 program year, with statutory requirements that POS provide a coordinated, non-duplicative progression of courses that link secondary and postsecondary education.

    - For example, at the local level, 68 percent of LEA directors and 70 percent of IHE directors reported that at least one of their five highest-enrollment POS spanned secondary and postsecondary education.

    - Smaller percentages reported that at least one of these POS was non-duplicative across the secondary and postsecondary levels (42 and 59 percent, respectively).

- Nearly two-thirds of LEA and IHE directors reported using articulation agreements with postsecondary and secondary partners to implement POS as of 2008–09, but about one-fifth said they did not know if their institutions had articulation agreements.

- IHE directors were more likely than LEA directors to report that their POS led to postsecondary credentials or degrees.

- Nearly half of all state secondary and postsecondary CTE directors (23 of each) reported in 2008–09 that CTE teachers or faculty did not have a good understanding of POS, suggesting that the POS concept was unclear to the instructors who are expected to deliver it.

- States and local subgrantees are not required to report on POS participation and outcomes, and there are no national data on the number of students participating in POS or the outcomes they achieve.

Accountability

- For each performance indicator, three-fourths or more of the states met at least 90 percent of their performance target in 2011–12, at both the secondary and postsecondary levels.
- Flexibility in the *Perkins* accountability system precludes the ability to use the performance indicator data for valid comparisons between states or for aggregating data across states to examine national progress over time.
- Local subgrantees used a variety of methods to identify CTE concentrators, including local management information systems, statewide databases, teacher identification of concentrators based on coursetaking, and student self-reports.
- *ESEA* assessments are often administered before students reach concentrator status, so the academic attainment indicator often provides information on the academic abilities of students who subsequently become CTE concentrators.
- Some states reported mathematics and English/language arts proficiency rates for CTE concentrators under *Perkins* that were unexpectedly higher than the proficiency rates they reported for all students under *ESEA* and that appear to be inconsistent with research findings. Similar patterns were found for reporting on graduation rates.
- Most states used administrative records to report on the placement of students who exited the program. At the secondary level, states most commonly used the state higher education database to acquire placement information about their students, while at the postsecondary level, the most commonly used data source was state unemployment insurance wage records.
- Most states reported using *Perkins* performance indicator data to identify programs needing improvement and to provide targeted technical assistance.

Student Outcomes

- The percentage of high school graduates completing 4-year college preparatory coursework nearly doubled from 1990 to 2009, and CTE students showed larger increases than did non-CTE students. However, this may reflect changes in who participated in CTE rather than the impact of CTE.
- The NACTE-commissioned studies, which used quasi-experimental methods to control for student background, found that CTE coursetaking had little or no relationship with academic achievement. Differences in achievement between CTE concentrators and non-concentrators were almost entirely explained by differences in student characteristics. Evidence on the relationship between CTE concentration and high school graduation is inconclusive.
- High school graduates who were CTE concentrators were less likely to attend or complete postsecondary education than were non-concentrators, but studies that controlled for student background found mixed results for college-going and degree attainment.
- College-going and completion rates varied considerably by CTE concentration field, as did continuation in the same CTE field at the postsecondary level. For example:

  - As of 2006, college-going rates for 2004 high school graduates ranged from 84 percent for CTE students who had concentrated in computer and information sciences to 52 percent for concentrators in repair and transportation.

  - Continuation in the same CTE field at the postsecondary level was most common among high school graduates who concentrated in health sciences or business.

  - Completion of a postsecondary degree or certificate in the same field was most common among high school graduates who concentrated in health sciences.

- Among students who initially enrolled in subbaccalaureate programs in 2003–04, students in CTE and academic fields had attained credentials at similar rates six years later (by 2009).

- Findings on employment and earnings outcomes for CTE students were mixed. For example:

  - Eight years after graduating from high school in 2004, CTE concentrators had average hourly wages that were not statistically different — no better but no worse — than those for graduates who were non-concentrators and had the same level of postsecondary attainment.

  - For CTE concentrators who did not enroll in postsecondary education, studies show mixed findings on employment and earnings outcomes. Some studies suggest that there may be higher returns for some CTE fields (e.g., construction and architecture) and programs (e.g., career academies).

  - Six years after starting postsecondary education, students who earned a CTE certificate or associate's degree were more likely to be employed and to consider their job to be the start of a career than were those who did not earn a subbaccalaureate credential. However, students who earned a bachelor's degree had even better employment outcomes.

  - Among postsecondary certificate holders who were working in an occupation related to their field of study, average earnings varied considerably by field, with the highest average earnings found for those working in computer and information sciences.

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Career and Technical Education in the 21st Century

As the fourth reauthorization of a law first enacted in 1984, *Perkins IV* was intended to raise the academic and technical rigor of secondary and postsecondary CTE instruction in order to prepare students for entry into high-skill, high-wage, or high-demand occupations. Under *Perkins IV*, subgrantees are now required to offer one or more programs of study (POS) that link secondary to postsecondary education through a sequenced, non-duplicative progression of CTE courses. Changes in *Perkins* accountability provisions expanded performance reporting requirements and extended accountability requirements to local subgrantees.

Introduction

Economic globalization and technological innovations are redefining the knowledge and skill expectations for 21st century workers (Carnevale and Rose 2011; Friedman 2005). Policymakers and educators are responding by emphasizing the preparation of high school students for college and careers — both options, not just one or the other — with the understanding that all youth will require some form of advanced education or skill training if they are to compete in today's labor market (Pathways to Prosperity Project 2011; Richmond 2009).

Postsecondary education and training has become increasingly important for students to develop the knowledge and skills they will need to succeed in the labor market (Carnevale, Smith, and Strohl 2013; Osterman 2008). Automation and technological advances, in combination with the outsourcing of jobs overseas, have lowered wages in many occupations that do not require advanced education or training and have eliminated domestic employment opportunities in many skilled trades.[5] While many high-skill, high-wage jobs do not require a bachelor's degree, an increasing number call for at least some postsecondary training. By 2020, nearly two-thirds of all jobs are expected to require workers who have completed some form of postsecondary education or training — with nearly half of these positions requiring at least an associate's degree (Carnevale, Smith, and Strohl 2013). CTE coursework at the postsecondary level offers students more specialized instruction — academic as well as technical — that culminates in the award of a certificate or degree that will help them secure employment or pursue further education.

The *Carl D. Perkins Career and Technical Education Act of 2006* (*Perkins IV)* continues a longstanding federal investment in career and technical education (CTE) through grants to states and subgrants to local entities such as local education agencies (LEAs) and institutions of higher education (IHEs).[6] As the fourth reauthorization of a law first enacted in 1984, *Perkins IV* was intended to raise the academic and technical rigor of secondary and postsecondary CTE instruction in order to prepare students for entry into high-skill, high-wage, or high-demand occupations.[7] Under *Perkins IV*, subgrantees are now required to offer one or more programs of study (POS) that link secondary to postsecondary education through a sequenced, non-duplicative progression of CTE courses. Changes in *Perkins* accountability provisions expanded performance reporting requirements and extended accountability requirements to local subgrantees.

This final report of the National Assessment of Career and Technical Education (NACTE) summarizes the most recent available data on the implementation of *Perkins IV*, as well as student

[5] Changes to the structure of work opportunities in the United States have been documented in the literature. See, for example, *Outsourcing America: The True Cost of Shipping Jobs Overseas and What Can Be Done About It* (Hira and Hira 2008) and *The World Is Flat* (Friedman 2005).

[6] Local secondary subgrantees may include LEAs, area CTE centers, educational service agencies, and consortia of eligible agencies. Local postsecondary subgrantees may include public or private nonprofit IHEs, LEAs and area CTE centers that provide CTE at the postsecondary level, postsecondary institutions controlled by the Bureau of Indian Affairs or operated by or on behalf of an eligible Indian tribe, educational service agencies, and consortia of eligible entities. Because LEAs account for nearly all secondary subgrantees (95 percent in FY 2010), and IHEs account for the large majority (86 percent) of postsecondary subgrantees (and 96 percent of postsecondary subgrant funds), this report sometimes uses the terms "LEA" and "IHE" to refer to local secondary and postsecondary subgrantees.

[7] The first three authorizations of the *Perkins Act* were: *Carl D. Perkins Vocational Education Act of 1984 (Perkins I); Carl D. Perkins Vocational and Applied Technology Education Act of 1990 (Perkins II)*; and *Carl D. Perkins Vocational and Applied Technology Education Act of 1998 (Perkins III)*.

participation and outcomes for CTE more generally. The report uses information from studies commissioned for the NACTE, reviews of existing research, and analyses of extant data from state performance reports and from the National Center for Education Statistics (NCES). Topics include student participation in CTE programs at the secondary and postsecondary levels, changes in *Perkins* funding levels and targeting, implementation of *Perkins IV* provisions regarding POS and accountability, and educational and employment outcomes for CTE students.

Changes Introduced in *Perkins IV*

Perhaps the most immediately apparent change in *Perkins IV* is its name change, from *Vocational and Applied Technology Education Act* to *Career and Technical Education Act*. This change follows a movement in the field to use the term "career and technical education," to differentiate the mission of contemporary career-focused education from that of the past.[8] *Perkins IV* defines CTE as a sequence of courses that, among other things, provides individuals with coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers, and provides technical skill proficiency, an industry-recognized credential, a certificate, or an associate's degree. Exhibit 1.1 provides the complete *Perkins IV* definition of CTE.

Exhibit 1.1.
Definition of CTE in *Perkins IV*

The term "career and technical education" means organized educational activities that

A) offer a sequence of courses that

   i. provides individuals with coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in current or emerging professions;

   ii. provides technical skill proficiency, an industry-recognized credential, a certificate, or an associate degree; and

   iii. may include prerequisite courses (other than a remedial course) that meet the requirements of this subparagraph; and

B) include competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of an industry, including entrepreneurship, of an individual.

SOURCE: *Carl D. Perkins Career and Technical Education Improvement Act of 2006*, Sec. 3(5).

[8] In 1998, the American Vocational Association changed its name to the Association for Career and Technical Education (ACTE). Similarly, in 2002, the state directors' association dropped the term *vocational* from its title, renaming itself "National Association of State Directors of Career Technical Education consortium" (NASDCTEc). While the term *vocational education* has fallen from favor in the United States, where it is often perceived as training for low-wage, low-skill jobs, other nations continue to use the term *Vocational Education and Training (VET)* to refer to workforce development programs that support students in obtaining diverse skills for a broad range of industries.

Key programmatic changes in *Perkins IV* include the following:

- ***Changes to accountability indicators*** — *Perkins IV* introduced separate indicators for secondary and postsecondary education, added two secondary indicators aligned with requirements under the *Elementary and Secondary Education Act of 1965, as amended (ESEA)*, and required reporting of disaggregated data to include the same subgroups as are used for *ESEA* reporting, in addition to the "special populations" that are specifically listed in the *Perkins* statute.

- ***Extension of performance accountability to the local level*** — LEAs, IHEs, and other subgrantees must now negotiate performance targets for each indicator with their state eligible agency. A subgrantee whose actual performance is below 90 percent of any of its negotiated targets must develop a program improvement plan and may face increasing sanctions if its performance does not improve.

- ***Introduction of POS*** — All local subgrantees must now offer one or more POS that consist of a sequenced, non-duplicative progression of CTE courses that are designed to connect secondary and postsecondary curricula and to lead to an industry-recognized credential or certificate at the postsecondary level, or an associate's or bachelor's degree. A POS must include rigorous content aligned with challenging academic standards and relevant technical content. Where appropriate, students may earn college credit while still enrolled in high school.

- ***Tech Prep*** — *Perkins IV* gave states the option to consolidate all or a portion of their *Perkins* Title II (Tech Prep) allocations into their *Perkins* Title I basic grant. Subsequently, in April 2011, Congress eliminated funding for Tech Prep, and the program has not been funded since that time. Tech Prep has essentially been replaced by the "programs of study" approach to linking high school and postsecondary CTE curricula. This report provides limited coverage of this discontinued program.

- ***Finance*** — *Perkins IV* made few changes to provisions concerning the allocation and use of *Perkins* funds. Aside from the new option to consolidate Tech Prep funds with Title I funds (discussed above), changes in fiscal provisions were relatively minor, such as a change in the allotment for outlying areas.

Exhibit 1.2 provides a summary of key provisions and changes from *Perkins I* through *Perkins IV* in the areas of accountability, secondary to postsecondary transitions (Tech Prep and POS), and finance.

Exhibit 1.2.
Key developments in *Perkins* legislation

	Perkins Act of 1984 (*Perkins I*)	*Perkins Act of 1990* (*Perkins II*)	*Perkins Act of 1998* (*Perkins III*)	*Perkins Act of 2006* (*Perkins IV*)
Program Year	**Fall 1985–Spring 1991**	**Fall 1991–Spring 1999**	**Fall 1999–Spring 2007**	**Fall 2007–Spring 2013**
Accountability	• Develop measures to assess effectiveness	• States must create measures to assess learning and competency gains but are not required to report on outcomes	• Core indicators of performance introduced, including student skill attainment, job and academic placement, and degree and credential attainment	• Separate secondary and postsecondary indicators introduced • Adoption of *ESEA* academic and high school graduation definitions and measures • Tech Prep indicators introduced • Local programs held accountable for setting and meeting performance targets
Secondary to Postsecondary Transitions (Tech Prep and POS)	• None	• Tech Prep introduced as a special project	• Tech Prep introduced as separate title	• Tech Prep programs optional • POS introduced; all local subgrantees must offer one or more POS
Finance	• Set-asides for special populations equal to 57 percent of basic grant resources • Program improvement equal to 43 percent of basic grant resources	• Secondary formula allocation based on students living in poverty (70 percent), students with disabilities (20 percent), and number of students enrolled in CTE programs (10 percent) • Postsecondary formula allocation based on number of Pell Grant and Bureau of Indian Affairs assistance recipients • Not less than 75 percent distributed to local programs	• Secondary formula allocation based on students living in poverty (70 percent) and youth aged 15–19 years residing within the LEA (30 percent) • Postsecondary formula allocation unchanged. • Not less than 85 percent distributed to local programs	• Secondary formula allocation unchanged • Postsecondary formula allocation unchanged • States offered option to merge Title II (Tech Prep) funds with Title I (basic grant) • Reduced allotment for outlying areas from 0.20 to 0.13 percent of total *Perkins* appropriation to correspond to the lower number of outlying areas that are eligible for funding • Funds may be used for prerequisite courses (other than a remedial course)

The National Assessment of Career and Technical Education

Perkins IV mandated an independent evaluation and assessment of CTE programs, including the implementation of new and revised requirements enacted in the 2006 reauthorization. An interim report of the NACTE, released in May 2013, described the overall research approach to meeting the congressional mandate and presented interim findings focused on participation and outcomes, as well as international comparisons of secondary school career and technical education.

This final report provides a comprehensive summary of key findings from the NACTE, using information from a study of *Perkins IV* implementation, commissioned studies of CTE student outcomes, reviews of existing research, and analyses of extant data to examine how states and local subgrantees, such as LEAs and IHEs, are responding to key provisions of *Perkins IV*. The report examines student participation in CTE programs at the secondary and postsecondary levels, changes in funding levels and targeting, implementation of *Perkins IV* provisions regarding accountability and POS, and achievement and employment outcomes for CTE students.

The NACTE was designed to examine the following research questions:

- Has student participation in CTE programs changed?
- How were Perkins IV funds allocated and used?
- How were states and local subgrantees developing and implementing programs of study that integrate academic and technical content across secondary and postsecondary education?
- How were states implementing the Perkins IV accountability provisions, and what measurement issues affect the validity and reliability of the accountability data that were reported?
- Are educational and employment outcomes showing positive results for secondary and postsecondary students who participated in CTE?

Independent Advisory Panel

Congress mandated the formation of an Independent Advisory Panel to advise the U.S. Department of Education on the implementation of the NACTE. The Department assembled a panel of 13 members including researchers with expertise in CTE and research methods, education and workforce development policy experts, and state and local practitioners (see Appendix A for list of panel members). The panel provided input on study plans and draft reports through a series of seven meetings held in Washington, D.C. The panel also prepared its own independent report with its findings and recommendations to Congress.

Data Sources Included in the NACTE

The NACTE summarizes data collected on the implementation and outcomes of programs supported under *Perkins IV*, including information from a study of *Perkins* implementation, commissioned studies of CTE student outcomes, reviews of existing research, and analyses of extant data. Key data sources are summarized briefly below and described in more detail in Appendix B:

- **Evaluation of the Implementation of the *Carl D. Perkins Career and Technical Education Act of 2006*.** This study, commissioned for the NACTE, conducted surveys, case studies, and analyses of extant data to provide information on the implementation of *Perkins IV* provisions for finance, accountability, and programs of study. The study surveyed state directors responsible for overseeing *Perkins* implementation at the secondary and postsecondary levels in the 50 states and the District of Columbia, as well as local program directors in a stratified random sample of 2,041 LEAs and area CTE centers[9] and 1,006 IHEs. Surveys were administered in fall 2009, and response rates were 100 percent for state secondary directors, 94 percent for state postsecondary directors, 77 percent for LEAs and CTE centers, and 91 percent for IHEs. Case studies were conducted in six states and 18 local communities (three per state, including one urban, one suburban, and one rural), including site visits and in-depth interviews. For the targeting analyses, suballocation data for the 2009–10 program year were obtained from 50 secondary and 49 postsecondary directors.

- **Commissioned studies of CTE student outcomes.** As part of the NACTE, the Department commissioned four independent studies that used longitudinal student-level data to examine the relationship between high school students' participation in CTE and secondary and postsecondary outcomes; each study used different methodological approaches and data sources. These studies primarily examined CTE students who were enrolled in high school prior to the implementation of *Perkins IV*; this approach was chosen in order to follow CTE students over a longer period of time than was possible for the period covered by *Perkins IV* implementation at the time these studies were initiated.

    - **Philadelphia.** This study took advantage of a natural experiment involving a lottery to select applicants to attend CTE high schools. The study used individual student records provided by the district, merged with National Student Clearinghouse data on postsecondary enrollment and completion, following students from the classes of 2003, 2004, and 2005 to examine a range of outcomes including coursetaking, high school graduation rates, and postsecondary attendance and completion. The analysis used multi-level regression models to compare outcomes for students who were accepted and not accepted to CTE high schools and also explored the effect of the amount of time that a student actually attended a CTE school on outcomes.

    - **San Diego.** This study used a fixed-effects model to examine the association between student CTE coursetaking and academic outcomes, following eight cohorts of high school students who entered ninth grade between 1998 and 2006. The study used individual student records provided by the district and merged them with postsecondary data from the National Student Clearinghouse; the data included student course taking, attendance, grades, test scores, high school completion, and postsecondary enrollment and completion.

    - **Florida.** This study analyzed individual secondary and postsecondary student records from the Florida Department of Education that tracked students who were in ninth grade in 1996 for 10 years, through 2007. The analysis used multivariate and logistic regression models to examine whether there was a relationship between CTE participation status and student outcomes.

[9] The sample for this survey included 2,993 LEAs and 48 area CTE centers. This report, for brevity, uses the term "LEA directors" when presenting findings from this survey.

- **Analysis of Education Longitudinal Study of 2002 (ELS) data.** This study used a fixed-effects model and data from a nationally representative longitudinal study of 2002 high school sophomores to examine the associations between CTE coursetaking and high school outcomes. The analysis used ELS data were from the baseline year; a first follow-up in spring 2004 when most students were high school seniors; and a transcript study, which collected transcripts beginning in the winter of 2004–05.

More detailed summaries of the methodologies and findings for these four studies are provided at the end of Chapter 6.

- **Reviews of existing research.** Study staff conducted a literature search to identify published reports that examined the implementation of *Perkins* and career and technical education more generally, as well as student outcomes for CTE students.

- **Analyses of extant data.** The NACTE also drew upon existing data from a variety of sources, including annual state reports as well as longitudinal and cross-sectional studies sponsored by NCES:

  - **Annual state reports.** States submit *Perkins* Consolidated Annual Reports to the U.S. Department of Education, as well as annual updates to their *Perkins* state plans; these include data on performance indicator targets and results, as well as certain fiscal data. The NACTE also used data from *ESEA* Consolidated State Performance Reports for comparative data on *ESEA* performance indicators. *Perkins* and *ESEA* performance indicator data are currently available for the 2011–12 school year.

  - **Education Longitudinal Study of 2002 (ELS).** This longitudinal study surveyed a national sample of students who were in the 10th grade in 2002 and conducted follow-up surveys of these students in 2004, 2006, and 2012, in order to follow their progress through high school and on to postsecondary education and the workforce.

  - **National Assessment of Educational Progress (NAEP) and the High School Transcript Study (HSTS).** NAEP is a nationally representative and ongoing assessment of what students in the United States know and can do in mathematics, reading, science, and other subjects. The HSTS is a part of NAEP that collects data about student coursetaking and credits earned. This report uses NAEP and HSTS data for 2009, the most recent year for which HSTS data on coursetaking are available.

  - **Schools and Staffing Survey (SASS).** The periodic SASS surveys of districts, schools, principals, and teachers collect information about teacher supply and demand, teacher and administrator characteristics, school programs, and general conditions in schools as well as staff perceptions of school climate, hiring and compensation, and student characteristics. The most recent SASS data available are for the 2011–12 school year.

  - **Integrated Postsecondary Education Data System (IPEDS).** This annual universe data collection gathers information from every college, university, and technical and vocational institution that participates in federal student financial aid programs. These data include information about student enrollments and completions, faculty and staff, institutional expenditures, and financial aid. The most recent IPEDS data available are for 2012.

- **National Postsecondary Student Aid Study (NPSAS).** Although the primary purpose of NPSAS is provide information on financial aid for postsecondary students, its large nationally representative sample of institutions and students is also useful for examining the characteristics of Title IV-eligible institutions and the students who are enrolled in them, including fields of study and credentials sought. The most recent NPSAS data available are for the 2011–12 academic year.

- **Beginning Postsecondary Students Longitudinal Study (BPS).** This periodic study surveys cohorts of first-time postsecondary students at the end of their first year and three and six years after first starting postsecondary education, collecting student demographic characteristics, school and work experiences, persistence, transfer, and degree attainment. The most recent BPS data available are for 2009, based on a cohort that began postsecondary education in 2003–04.

Significance Testing

For original analyses conducted for the NACTE, references in the text to differences between groups or over time that are based on sample data only discuss differences that are statistically significant using a significance level of 0.05. The significance level, or alpha level, reflects the probability that a difference between groups as large as the one observed could arise simply due to sampling variation, if there were no true difference between groups in the population. A failure to reach this level of statistical significance does not necessarily mean that two groups were the same or that there was no change over time; a lack of statistically significant findings simply means that no reliable conclusion can be drawn from the analyses that were conducted. The tests were conducted by calculating students' *t*-statistic, which tests the difference between two sample estimates. The *t*-test formula was not adjusted for multiple comparisons. Standard error tables for exhibits that are based on sample data are included in Appendix C.

Definitions of Terms Used in This Report

Although *Perkins IV* provides a statutory definition of the term "career and technical education," it does not identify specific subjects or fields that are to be considered as CTE; rather, grantees and subgrantees are expected to design and implement CTE courses and course sequences that meet the criteria in the law. Specific occupational CTE courses may be classified by labor market preparation area in different ways in state and local practice or in various data sources. For analytic purposes, NCES developed taxonomies for classifying CTE and academic fields of study at the secondary and postsecondary levels in a consistent way across data collections.[10]

[10] To enable these different surveys to provide consistent information on students' fields of study, NCES has developed taxonomies for classifying coursetaking into specific fields, including CTE fields as well as academic fields. At the secondary level, coursetaking information from high school transcripts is coded using the Classification of Secondary School Courses (CSSC), and this information is then aggregated into broad subject areas in order to summarize student coursetaking in CTE as well as in academic fields. The 21 secondary CTE fields are often aggregated into a smaller set of 12 CTE fields in order to create more analytically powerful comparison groups as well as to simplify the presentation of data. At the postsecondary level, survey data on student majors or fields of study are classified using the 2000 Classification of Instructional Programs (CIP), and the detailed CIP fields are aggregated into 13 major CTE fields. CTE information from these data collections is consolidated in NCES' Career/Technical Education Statistics (CTES) system (http://nces.ed.gov/surveys/ctes/).

This report uses the following general definitions of secondary and postsecondary CTE in analyzing available data on student participation and outcomes:

- ***Secondary CTE:*** At the secondary level, occupational CTE is coursework designed to prepare students for work in a specific occupational field or for related postsecondary education or training, while non-occupational CTE includes instruction in generic employment skills such as basic computer literacy, introduction to technology, and general work experience (general labor market preparation) as well as coursework that prepares students for roles outside the paid labor market (family and consumer sciences education).[11] Analyses in this report focus primarily on occupational CTE but sometimes also include non-occupational CTE.
- ***Postsecondary CTE:*** At the postsecondary level, CTE is undergraduate instruction that is designed to prepare students to enter specific occupations or careers. *Perkins* postsecondary funds generally support CTE activities and programs at the subbaccalaureate level, and most of the information in this report on postsecondary CTE participation and outcomes is focused on subbaccalaureate programs and students. However, the report also provides some information on participation in bachelor's degree programs in CTE fields, to provide additional context.

Exhibit 1.3 shows the specific labor market preparation areas that are used in this report's analyses of NCES data at the secondary and postsecondary levels.

Exhibit 1.3.
Labor market preparation areas included in analyses of survey data on occupational CTE courses at the secondary and postsecondary levels

Secondary	Postsecondary
Agriculture and natural resources	Agriculture and natural resources
Business	Business management Business support
Communications and design	Communications and design
Computer and information sciences	Computer and information sciences
Consumer and culinary services	Consumer services
Construction and architecture Engineering technologies	Engineering, architecture, and science technologies
Manufacturing Repair and transportation	Manufacturing, construction, repair, and transportation
Marketing	Marketing
Health sciences	Health sciences
Public services	Public, legal, and social services Education Protective services

SOURCE: Bradby and Hudson (2007). See Exhibit D.1 in Appendix D for a more detailed version of the Bradby and Hudson crosswalk between secondary and postsecondary taxonomies for career and technical education.

[11] Students training for paid employment in family and consumer sciences education and human sciences are included in the consumer and culinary services occupational area (Bradby and Hudson 2007).

Definitions of CTE Participants and Concentrators

At both the secondary and postsecondary levels, the terms *participant* and *concentrator* are used to differentiate between students who may have earned only one CTE credit and those who earned a larger number of credits in a single CTE field. The definitions used for *Perkins IV* reporting purposes are established by states and thus may vary across states. The U.S. Department of Education released nonregulatory guidance with recommended definitions of CTE participants and CTE concentrators (Exhibit 1.4), but states may choose to set their own definitions.

Exhibit 1.4.
Definitions of CTE participants and concentrators in nonregulatory guidance

Term	Secondary	Postsecondary
CTE participant	A secondary student who has earned one or more credits in any CTE program area.	A postsecondary/adult[a] student who has earned one or more credits in any CTE program area.
CTE concentrator	A secondary student who has earned three or more credits in a single CTE program area, or two credits in a single CTE program area for which two credit sequences at the secondary level are recognized by the State and/or its local eligible recipients.	A postsecondary/adult student who (1) completes at least 12 academic or CTE credits within a single program area sequence that is comprised of 12 or more academic and technical credits and terminates in the award of an industry-recognized credential, a certificate, or a degree; or (2) completes a short-term CTE program sequence of less than 12 credit units that terminates in an industry-recognized credential, a certificate, or a degree.

[a] Although *Perkins IV* does not refer to an "adult" population for accountability reporting, the Department's nonregulatory guidance uses the term "postsecondary/adult" in the population definitions. Several states offer adult CTE programs outside their community and technical colleges, and some states have negotiated separate performance targets and reported separate data for their adult programs (in 2013–14, Florida, Louisiana, Ohio, Oklahoma, Rhode Island, Tennessee, and the District of Columbia) (U.S. Department of Education 2014).
SOURCE: Justesen (2007).

At the secondary level, 15 states defined concentrators as students who earn three or more credits in a single occupational area and 18 states used other credit thresholds based on a single occupational area (12 states required two or more credits, three states required one or 1.5 credits, and three states required four or more credits). Seven states permitted the number of required credits to vary depending on the specific program, and 11 states applied other types of definitions (Exhibit 1.5).

Exhibit 1.5.
Number of states using various definitions for CTE concentrators at the secondary level

Definition	Number of states
4 or more credits	3
3 or more credits	15
2 or more credits	12
1.5 or more credits	2
1 or more credits	1
1+ or 2+ depending on program	3
2+ or 3+ depending on program	4
Completed 50 percent of the program	9
Other (e.g., completed advanced-level work)	2

Exhibit reads: Three states defined CTE concentrators as students who earned four or more credits in a single occupational area.

SOURCE: U.S. Department of Education, Office of Vocational and Adult Education (2013), *Carl D. Perkins Career and Technical Education Act of 2006, Report to Congress on State Performance: Program Year 2009–10*.

In this report, the chapter on implementation and outcomes for the *Perkins IV* accountability indicators (Chapter 5) uses the indicator data submitted by states, which are based on the definitions of participant and concentrator chosen by each state. However, when analyzing data from NCES datasets and certain other sources, this report follows the common research practice of using consistent definitions of the terms "CTE student," "participant," and "concentrator" in order to provide analyses of CTE participation and outcomes that are comparable across states and the nation. At the postsecondary level, CTE students are generally considered to be students who are seeking a subbaccalaureate credential (i.e., a certificate or associate's degree) in a CTE field, based on their major or field of study. At the secondary level, we use the following definitions:[12]

- ***Participant:*** A secondary student earning at least one credit in occupational CTE courses.
- ***Concentrator:*** A secondary student earning three or more credits within a single CTE occupational area.
- ***Non-concentrator:*** A secondary student who had not earned sufficient CTE credits to meet the concentrator definition in the preceding bullet; these include students who earned no CTE credits as well as those who earned some CTE credits but not enough to meet the definition of a concentrator.

[12] These definitions are generally used by researchers for analyses of national data from NCES and other sources to enhance the comparability of data across states (Hudson and Laird 2009; Levesque and Hudson 2003).

Study Limitations

This report has three main limitations. First, the most recent data for many of the data sources included in this data were for years when key provisions of *Perkins IV* were still in the early stages of implementation, and many individuals in the studies had had limited, if any, exposure to changes enacted in *Perkins IV*. Although enacted in August 2006, the first year of *Perkins IV* implementation was the 2007–08 program year.[13] Not only did states have the option to submit a transition plan for the 2007–08 program year, but also some of the new or revised provisions (such as POS) would take years to implement fully. The *Perkins IV* implementation study was conducted during the 2009–10 program year, and 2009 was the most recent data available for three of the NCES datasets used in this report (HSTS, NAEP, and BPS). The four commissioned studies covered a variety of time periods, but generally covered periods prior to *Perkins IV* implementation.

A second limitation is that the NCES datasets that were used for analyses of CTE student participation and outcomes do not always use consistent definitions for CTE fields or concentrators. In addition, the three-credit definition for CTE concentrators that was used to conduct consistent analyses across datasets and states is different from the definitions adopted by many states; indeed, some states require fewer than three credits, as discussed above, and schools may not actually offer three credits in the same field.

Finally, the NACTE was not able to examine the effects or effectiveness of *Perkins IV* and instead provides information on implementation of the *Perkins IV* provisions and on student participation and outcomes related to CTE in general. When looking at student outcomes, most of the studies are correlational rather than rigorous impact studies designed to assess effects on students. In addition, local subgrantees may offer CTE programs supported by multiple funding sources and may be influenced by other federal, state, and local requirements, making it difficult to disentangle the effects of federal CTE policies from those of other initiatives.

Despite these limitations, the information presented in this report represents the most current and comprehensive assessment of how states and local subgrantees are responding to the provisions of *Perkins IV* and the challenges they face in designing, implementing, and administering CTE programs.

[13] Signed into law on August 12, 2006, *Perkins IV* authorized appropriations for FY 2007 through FY 2012. Program authorizations were automatically extended for one year (FY 2013) under section 422 of the *General Education Provisions Act*, and some programs were subsequently continued in the FY 2014 *Consolidated Appropriations Act*.

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2

CTE Programs and Participation

In the United States, career and technical education is widespread at both the secondary and postsecondary levels. Most American high school students take at least one CTE course, and at the postsecondary level, CTE students account for nearly three-fourths of all students seeking a subbaccalaureate credential. This chapter examines the extent to which secondary and postsecondary students participate in CTE, describes the characteristics of students enrolling in CTE coursework at the secondary and postsecondary level, and provides descriptive data on certain qualifications of secondary CTE teachers.

Key Findings

- Nearly all public high school students (95 percent of ninth-grade students in 2009) attended a school that offered CTE instruction, either on campus or at a partnering school. In 2009, 85 percent of public high school graduates had completed one or more occupational CTE courses, 76 percent had earned at least one full credit in occupational CTE, and 19 percent were CTE concentrators who had earned at least three credits in the same CTE field.
    - The most common occupational CTE subject areas for secondary students were business (33 percent of high school graduates), communications and design (30 percent), and computer and information sciences (21 percent).
- Secondary occupational CTE coursetaking declined slightly from 1990 to 2009, while academic coursetaking increased. However, some CTE occupational areas saw large increases in secondary coursetaking from 1990 to 2009, including health sciences (+222 percent) and public services (+153 percent), while large declines in coursetaking occurred in other areas such as manufacturing (–42 percent) and business (–37 percent).
- In 2011–12, secondary teachers who taught occupational CTE were less likely to have a bachelor's or master's degree than were academic teachers. However, CTE teachers reported receiving more hours of professional development in that year than did academic teachers.
- At the postsecondary level, 2-year institutions accounted for two-fifths of all institutions offering CTE subbaccalaureate credentials but over three-fourths of undergraduate students who were seeking such credentials.
- More than 8 million students were seeking a subbaccalaureate certificate or degree in a CTE field in 2011–12. Over half of these postsecondary CTE students were in the fields of health sciences (36 percent) or business (17 percent).
- The number of students earning subbaccalaureate credentials in CTE fields rose 71 percent from 2002 to 2012, compared with a 54 percent increase in all undergraduate awards.
    - Some CTE fields showed even greater rates of growth in certificates and associate's degrees (e.g., a 137 percent increase for health sciences), while others showed declines (e.g., a 44 percent decline for marketing).
- Certificate seekers tended to be older than students seeking a bachelor's degree and were more likely to be from a lower-income stratum.

Secondary CTE Programs

Career and technical education is typically offered in one of three settings: comprehensive high schools, full-time CTE schools, or area or regional CTE centers. Comprehensive high schools primarily have an academic focus but may offer elective CTE courses either on-site or at an affiliated area or regional CTE center. Full-time CTE high schools emphasize career and technical coursework in conjunction with an academic curriculum. Area or regional CTE centers serve students who attend comprehensive high schools for their academic instruction and attend the CTE centers part-time to receive CTE instruction (Levesque et al. 2008).

Nearly all public high school students attended a school that offered CTE instruction.

Ninety-five percent of ninth-grade students who attended public schools in 2009 were enrolled in schools that offered CTE programs either on campus or in a partnering off-site location, such as an area CTE school, postsecondary institution, or other high school facility.[14]

Educators are experimenting with a range of approaches and school organizations to deliver CTE services, some of which employ applied learning as a vehicle for teaching all students. For example, career academies are schools-within-schools located within comprehensive or full-time CTE high schools, which integrate academic and technical curricula around one or more career themes to provide students with a context for learning (Kemple and Willner 2008); 25 percent of public high schools offered career academies in 2011–12.[15]

Another example is Project Lead the Way (4,000 schools), which introduces high school students to engineering concepts through the use of a uniform 4-year curriculum.[16] The High Schools That Work program (1,200 schools), developed by the Southern Regional Education Board, emphasizes the integration of academic and technical skills and work-based learning to prepare students for postsecondary education and careers.[17]

[14] U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study (HSLS), 2009.
[15] U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Schools and Staffing Survey (SASS), 2012. See http://nces.ed.gov/surveys/sass/tables/sass1112_2013312_s2s_007.asp.
[16] For information on Project Lead the Way, see www.pltw.org.
[17] For information on High Schools That Work, see www.sreb.org/page/1137/about_high_schools_that_work.html.

Secondary Student Participation

In 2009, 85 percent of public high school graduates had completed one or more occupational CTE courses, 76 percent had earned at least one full credit in occupational CTE, and 19 percent were CTE concentrators who had earned at least three credits in the same CTE field.

While 19 percent of public high school graduates met this report's definition of CTE concentrator by earning at least three credits in the same occupational field, almost twice as many students (36 percent) had earned at least three credits in one or more occupational CTE fields (Exhibit 2.1). Looking at non-occupational CTE, 59 percent of public high school graduates earned credit in general labor market preparation and 34 percent earned credit in family and consumer sciences education. Overall, 94 percent of graduates earned credit in either occupational and/or non-occupational CTE.[18]

Exhibit 2.1.
Percentage of public school graduates who had earned various amounts of occupational CTE credits, by occupational area, 2009

Occupational area	Any credit	At least one credit	At least two credits	At least three credits
Any CTE occupational area	85	76	53	36
Same CTE occupational area	†	†	36	19
Business	33	23	7	2
Communications and design	30	20	6	2
Computer and information sciences	21	13	3	1
Consumer and culinary services	18	10	4	2
Manufacturing	13	8	3	1
Engineering technologies	11	8	2	1
Agriculture and natural resources	11	9	4	3
Health sciences	10	8	4	3
Public services	10	7	1	1
Marketing	8	6	2	1
Repair and transportation	8	6	3	2
Construction and architecture	7	5	2	1

Exhibit reads: In 2009, 85 percent of public high school graduates earned credit in one or more occupational CTE areas.

† Not applicable.
NOTES: Credit is a standardized measure used to provide a consistent measure of coursetaking from the student transcript data collected in the High School Transcript Study (HSTS). In the HSTS, a credit is equivalent to one Carnegie unit, which is awarded for a class that meets for one period per day for the entire school year or the equivalent instructional time. It is possible for students to earn less than one Carnegie unit if a class meets less than one period per day for the entire school year. The rows for "Any CTE occupational area" and "Same CTE occupational area" do not represent totals of the rows for individual occupational areas.
SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Transcript Study (HSTS), 2009.

[18] U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2009. See http://nces.ed.gov/surveys/ctes/tables/h123.asp.

The most common occupational CTE subject areas for secondary students were business, communications and design, and computer and information sciences.

Among all public high school graduates in 2009, 33 percent earned course credit in business, 30 percent in communications and design, and 21 percent in computer and information sciences (Exhibit 2.1). For CTE concentrators, differences among occupational fields were not statistically significant.

Occupational CTE coursetaking declined slightly from 1990 to 2009, while academic coursetaking increased.

The percentage of public high school graduates who earned any occupational CTE credit declined from 88 percent in 1990 to 85 percent in 2009, and CTE concentrators declined from 24 percent to 19 percent of graduates. However, the percentage who earned at least one occupational CTE credit in 2009 was not statistically different from that in 1990 (76 vs. 78 percent) (Exhibit 2.2).

Exhibit 2.2.
Percentage of public school graduates who earned occupational CTE credits, for selected years from 1990 to 2009

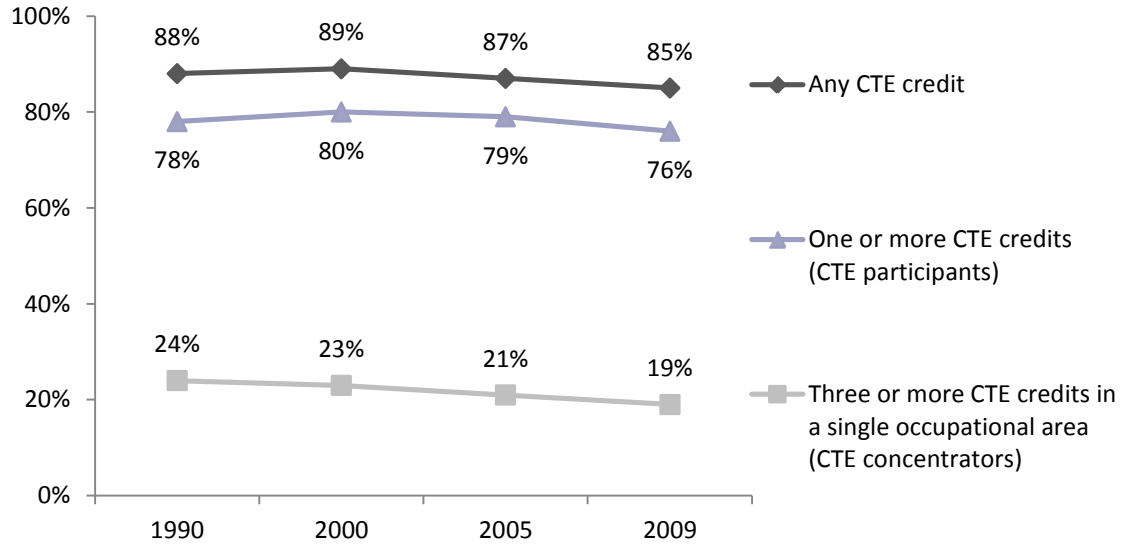

Exhibit reads: The percentage of public high school graduates who had earned credit for completing at least one occupational CTE course declined from 88 percent in 1990 to 85 percent in 2009.

NOTE: Typically, a student earns a full CTE credit (1.0 credits) by completing a year-long course and may earn a partial credit for completing a single semester of a CTE course.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 1990, 2000, 2005, and 2009.

The average number of occupational CTE credits earned by public high school graduates declined slightly, from 2.7 credits in 1990 to 2.5 credits in 2009, and non-occupational CTE credits declined from 1.5 to 1.1 credits. Over the same period, the overall number of credits earned by public high school graduates rose from 23.5 credits to 26.9 credits. This increase was largely related to increases in student academic coursetaking, which rose from 16.7 to 20.0 credits (Exhibit 2.3). Many states increased high school graduation requirements during this period; for example, the number of states requiring at least 4 credits in mathematics increased from zero states in 1987 to 11 states in 2008 (Stillman and Blank 2009).

Exhibit 2.3.
Average number of credits earned by public high school graduates during high school, by curricular area, 1990 and 2009

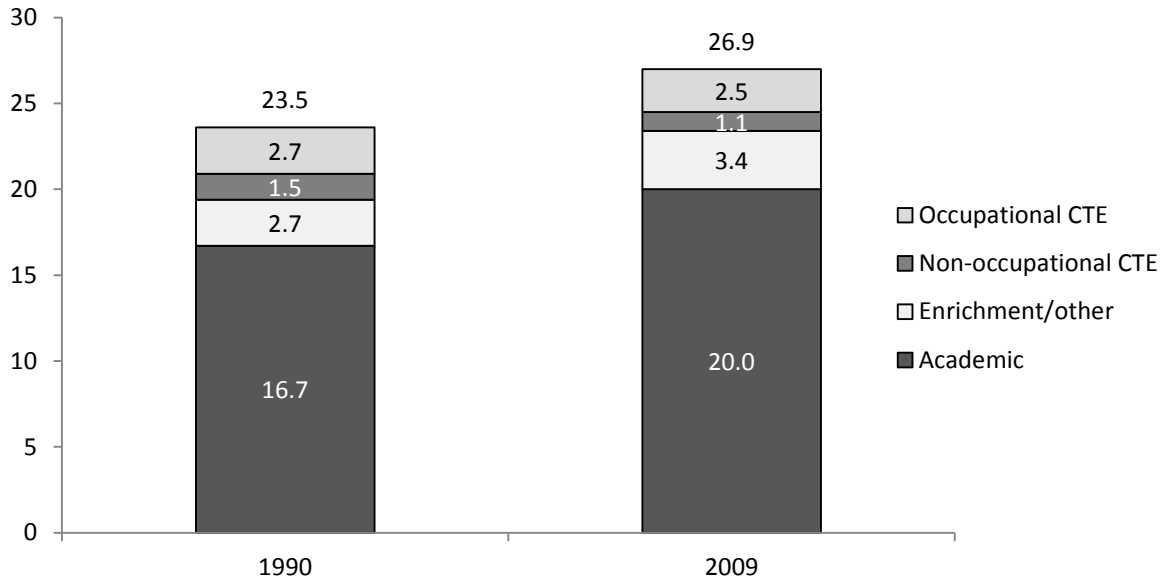

Exhibit reads: In 1990, public high school graduates had earned a total of 23.5 credits, including 16.7 credits in academic courses, 2.7 credits in enrichment courses, 1.5 credits in non-occupational CTE, and 2.7 credits in occupational CTE.

NOTES: "Enrichment/other" includes credits earned in areas such as health, physical, and recreational education; religion and theology; and military science, among other areas. Detail may not sum to totals due to rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 1990 and 2009.

Decreased CTE coursetaking in conjunction with increased academic course requirements have reduced the relative number of CTE credits earned by public high school graduates: occupational CTE credits declined from an average of 11 percent of total credits in 1990 to 9 percent in 2009. Overall, in 2009, academic courses accounted for 74 percent of total credits earned, occupational CTE for 9 percent, and non-occupational CTE for 4 percent; enrichment and other courses accounted for the remaining 13 percent of credits (see Exhibit C.3).

Some CTE occupational areas saw large increases in coursetaking from 1990 to 2009, including health sciences (+222 percent) and public services (+153 percent), while large declines in coursetaking occurred in other areas such as manufacturing (–42 percent) and business (–37 percent).

The percentage of public high school graduates who earned one CTE credit in health sciences more than tripled, rising from 3.2 percent in 1990 to 10.3 percent in 2009. Large increases in CTE coursetaking also occurred in public services (from 3.8 to 9.6 percent of graduates) and communications and design (from 18.4 to 29.6 percent) (Exhibit 2.4).

Over the same period, the percentage of public high school graduates earning occupational CTE credits declined in manufacturing (from 22.4 to 12.9 percent), business (from 51.7 to 32.5 percent), repair and transportation (from 10.1 to 8.0 percent), and engineering technologies (from 13.7 to 11.1 percent) (Exhibit 2.4).

Exhibit 2.4.
Percentage change in the percentage of public school graduates who earned occupational CTE credits, by occupational area, 1990 and 2009

Occupational area	1990	2009	% Change
Health sciences	3.2	10.3	222
Public services	3.8	9.6	153
Communications and design	18.4	29.6	61
Consumer and culinary services	13.8	18.0	30
Agriculture and natural resources	9.1	10.7	18
Marketing	8.5	8.5	*
Construction and architecture	7.4	6.7	*
Computer and information sciences	25.1	21.2	*
Engineering technologies	13.7	11.1	–19
Repair and transportation	10.1	8.0	–21
Business	51.7	32.5	–37
Manufacturing	22.4	12.9	–42
Any CTE occupational area	88.2	84.9	–4

Exhibit reads: The percentage of public high school graduates who earned occupational CTE credits in the health sciences increased from 3.2 percent in 1990 to 10.3 percent in 2009, an increase of 222 percent.

*Percentage change is not statistically significant.
SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Transcript Study (HSTS), 1990 and 2009.

Characteristics of Secondary CTE Students

Although participation in CTE courses was widespread among public high school students, the percentage of students who were CTE concentrators varied among students with different characteristics.

Among students who graduated from high school in 2009, those who had completed more challenging mathematics courses in the ninth grade were less frequently CTE concentrators than were other students. For example, CTE concentrators accounted for 14 percent of those who had completed geometry (or a higher-level course) in ninth grade, compared with 20 percent of those who had completed algebra and 24 percent of those who completed a lower-level course or no

mathematics course. Graduates with disabilities were more frequently CTE concentrators than were those with no reported disabilities (27 vs. 18 percent). However, graduates who were classified as limited English proficient (LEP) in the 12th grade were less frequently CTE concentrators than those with no reported limited English proficiency (however, relatively few students are classified as LEP in the 12th grade). Among racial/ethnic groups, the lowest percentage of CTE concentrators was found among Asians (7 percent in 2009), while much higher CTE concentrator rates were found for blacks (23 percent), whites (20 percent), American Indians (18 percent), and Hispanics (17 percent). Male graduates were more likely to be CTE concentrators than were female graduates (21 vs. 17 percent) (Exhibit 2.5).

Exhibit 2.5.
Percentage of public high school graduates who were CTE concentrators, by student characteristics, 1990 and 2009

Student characteristic	1990	2009
Mathematics course completion in 9th grade		
Geometry or higher	9	14
Algebra	18	20
Below algebra or no mathematics	33	24
Disability status in 12th grade		
Students with disabilities	37	27
Students with no reported disability	23	18
Limited English proficiency in 12th grade		
Limited English proficient	12!	13
No reported limited English proficiency	24	19
Race/ethnicity		
White	24	20
Black	24	23
Hispanic	24	17
Asian	12	7
American Indian	30	18
Other	‡	14
Sex		
Male	25	21
Female	23	17
All CTE concentrators	24	19

Exhibit reads: Among students who graduated from high school in 1990, 9 percent of those who had completed geometry (or a higher-level course) in ninth grade were CTE concentrators.

‡ Reporting standards are not met; the standard error represents more than 50 percent of the estimate.
! Interpret data with caution. Estimate is unstable because the standard error represents more than 30 percent of the estimate.
SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Transcript Study (HSTS), 1990 and 2009.

Secondary CTE Instructors

In 2012, about 8 percent of the more than 1 million grade 9–12 teachers in public high schools identified their main teaching assignment as a subject associated with a specific CTE occupational field. In addition, 3 percent of grade 9–12 teachers taught general labor market preparation, and 2 percent taught family and consumer sciences education. Academic teachers accounted for about

two-thirds (68 percent) of secondary teachers; the remaining 20 percent of high school teachers had other types of teaching assignments such as special education and physical education.[19]

This section examines certain characteristics of occupational CTE teachers in comparison to academic teachers, including degree attainment, certification, and participation in professional development. However, it should be noted that CTE teachers may have other kinds of preparation and qualifications, such as industry certification or experience, for which data are not systematically collected in existing national data collections.

Occupational CTE teachers were less likely to have a bachelor's or master's degree than were academic teachers.

In 2011–12, public school grade 9–12 CTE teachers were less likely than academic teachers to have a bachelor's degree or higher degree (82 vs. 97 percent) or a master's degree or higher degree (46 vs. 59 percent). The percentage of CTE teachers with bachelor's and master's degrees varied by CTE field (Exhibit 2.6).

Exhibit 2.6.
Percentage of grade 9–12 public school teachers who had attained bachelor's degree or higher and a master's degree or higher, by main teaching assignment and CTE occupational area, 2011–12

Main teaching assignment and CTE occupational area	Bachelor's degree or higher	Master's degree or higher
Main teaching assignment		
Occupational CTE	82	46
Academic education	97	59
All subjects	95	57
CTE occupational area		
Marketing	99	63
Business	96	64
Agriculture and natural resources	93	38
Computer and information sciences	90	57
Communications and design	82	52
Health sciences	81	36
Consumer, culinary, and public services	72	48
Construction, architecture, and engineering technologies	69	32
Manufacturing	47	‡
Repair and transportation	26	12 !

Exhibit reads: Among grade 9–12 public school teachers who reported that occupational CTE was their main teaching assignment, 82 percent had earned a bachelor's degree or higher degree.

! Interpret data with caution. Estimate is unstable because the standard error represents more than 30 percent of the estimate.
‡ Reporting standards are not met; the standard error represents more than 50 percent of the estimate.
NOTE: Fifteen percent of occupational CTE teachers possessed an associate's degree or a postsecondary certificate, and 4 percent had no degree or certificate.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Questionnaire," 2011–12.

[19] U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Questionnaire," 2011–12. "Other" teaching assignments also included health education; military science or Reserve Officers' Training Corps; religious studies, theology, or divinity; and other unspecified teaching assignments. These "other" teachers are excluded from analyses presented in this chapter.

While some states require all CTE instructors to meet the same licensure and certification requirements as their academic counterparts, most allow CTE instructors to enter the teaching profession by substituting work experience for academic coursework. Most states require CTE teachers with an alternative classification to pass a state-approved licensure exam; as of 2007, 48 states required CTE teachers with traditional teacher training to pass a state-approved licensure exam and 46 states required the exam for alternatively prepared CTE teachers. All 50 states also offer the option for teachers to obtain provisional or temporary teaching licenses that provide teachers in high-need areas with time to fulfill additional certification requirements, such as coursework and passing a teacher test (Zirkle, Martin, and McCaslin 2007).

Occupational CTE teachers were less likely than academic teachers to hold regular state certification and also were more likely to have entered teaching through an alternative certification process.

In 2011–12, 85 percent of CTE teachers held a regular state certification, compared with 91 percent of academic teachers. CTE teachers were more likely to have a provisional teaching certification than were academic teachers (14 vs. 8 percent) (Exhibit 2.7). In that same year, one-third (33 percent) of CTE teachers had entered teaching through an alternative certification process, compared with 19 percent of academic teachers.[20]

Exhibit 2.7.
Percentage distribution of grade 9–12 public school teachers' type of certification, for occupational CTE teachers and academic teachers, 2011–12

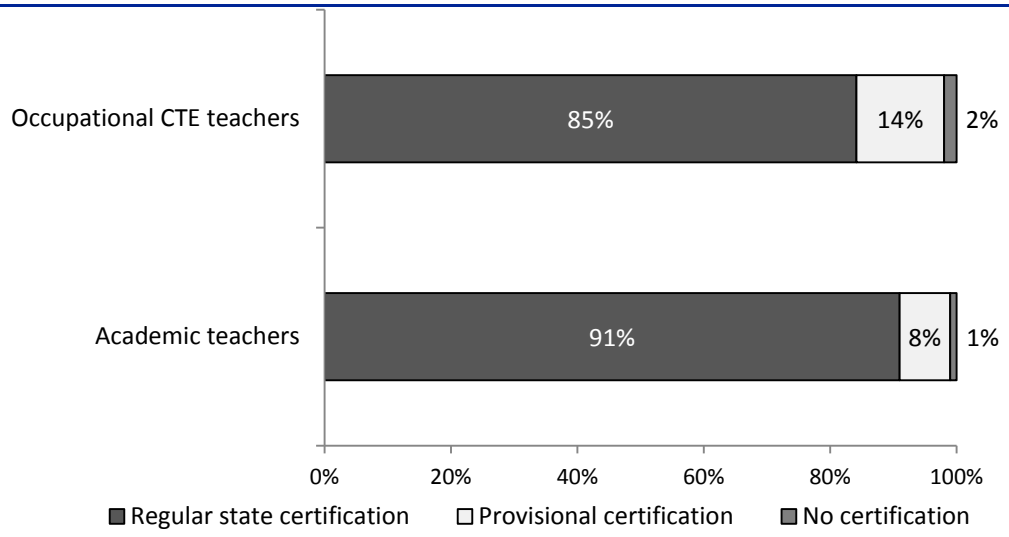

Exhibit reads: Among grade 9–12 public school teachers who reported that occupational CTE was their main teaching assignment, 85 percent had regular state certification, 14 percent had provisional certification, and 2 percent had no certification.

NOTES: Provisional certification includes those issued after satisfying all requirements except the completion of a probationary period and those that require additional coursework, student teaching, passage of a test, or completion of a certification program. Detail may not sum to 100 percent due to rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Questionnaire," 2011–12.

[20] NCES, Schools and Staffing Survey, http://nces.ed.gov/surveys/ctes/tables/h120.asp.

Professional development

Effective teaching requires high quality and relevant professional development throughout a teacher's career (Darling-Hammond et al. 2009). In the case of CTE instructors, professional development may be particularly important due to the relatively high number of career changers who enter the teaching profession directly from industry (National Research Center for Career and Technical Education 2010). Industry experience and connections can help CTE teachers understand the knowledge and skills that are required in the field, but teachers also need pedagogical skills to transfer that knowledge to students. CTE teachers also need exposure to new and changing technologies to stay current in their fields. As one local CTE administrator noted, "Funds should be concentrated on professional development because technology is changing rapidly and instructors need to be able to teach at that level" (Klein et al. 2014).

CTE teachers reported receiving more hours of professional development, on average, than did academic teachers.

In 2011–12, CTE teachers were more likely than academic teachers to report 17 hours or more of professional development (58 vs. 52 percent, respectively), although CTE teachers and academic teachers were equally likely to report more than 32 hours of professional development (28 percent of each group) (Exhibit 2.8).

Exhibit 2.8.
Percentage distribution of grade 9–12 public school teachers who participated in professional development, for occupational CTE teachers and academic teachers, 2011–12

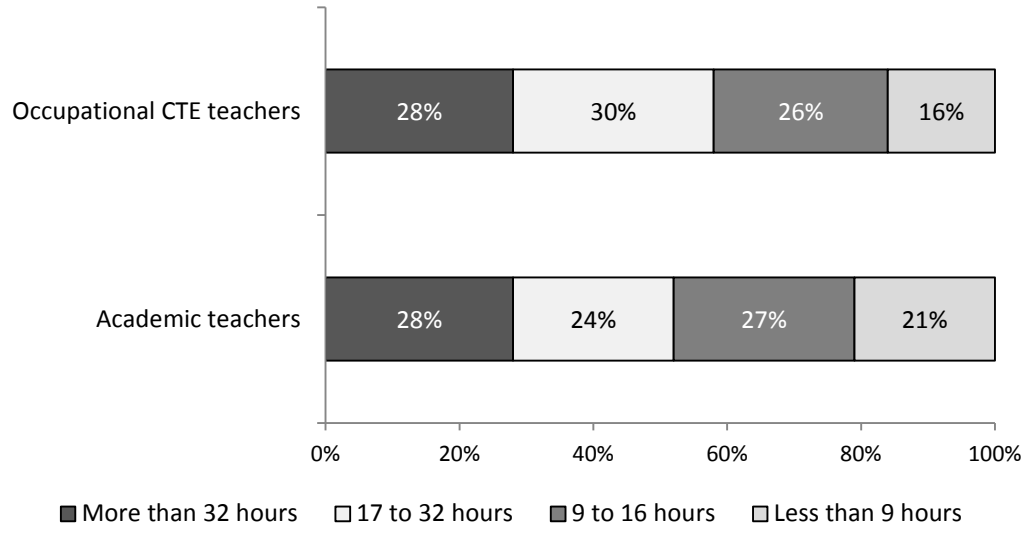

Exhibit reads: Twenty-eight percent of grade 9–12 public school occupational CTE teachers had more than 32 hours of professional development in 2011–12; 30 percent had 17–32 hours; 26 percent had 9–16 hours; and 16 percent had less than 9 hours.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Questionnaire," 2011–12.

Postsecondary CTE Programs

At the postsecondary level, the term "CTE" refers to undergraduate instruction that is designed to prepare students to enter specific occupations or careers. *Perkins* postsecondary funds generally support CTE education at the subbaccalaureate level, and most of the information in this report on postsecondary CTE participation and outcomes is focused on subbaccalaureate programs and students. However, the report also provides some information on participation and outcomes for bachelor's degree programs in CTE fields.

The NCES data used in this section to describe CTE postsecondary programs and participation are based on a taxonomy that classifies undergraduate majors and instruction as CTE for the following 13 career/technical fields: agriculture and natural resources; business management; business support; communications and design; computer and information sciences; consumer services; education; engineering, architecture, and science technologies; health sciences; marketing; protective services; public, legal, and social services; and manufacturing, construction, repair, and transportation.

Access to Postsecondary CTE

In 2011–12, some 5,767 postsecondary institutions — roughly 80 percent of all postsecondary institutions that are eligible to participate under Title IV of the *Higher Education Act of 1965, as amended (HEA)*[21] — offered a postsecondary certificate or associate's degree in a CTE field (Exhibit 2.9).

Two-year institutions accounted for two-fifths of all institutions offering CTE subbaccalaureate credentials but over three-fourths of undergraduate students who were seeking such credentials.

In 2011–12, 2-year postsecondary institutions accounted for 40 percent of all postsecondary institutions that offered CTE certificates or associate's degrees and 77 percent of students who were seeking a subbaccalaureate credential in a CTE field. In contrast, 4-year institutions accounted for 27 percent of CTE-offering institutions but a smaller percentage of students (13 percent). Less-than-2-year institutions accounted for 34 percent of institutions awarding CTE credentials and 10 percent of CTE students (Exhibit 2.9).

[21] Title IV institutions are postsecondary institutions eligible to participate in any of the Title IV federal student financial assistance programs, which include Pell Grants and direct student loans, among other types of assistance. However, not all Title IV institutions are eligible to receive subgrants under *Perkins IV*. To receive a subgrant under *Perkins IV*, a postsecondary institution must meet the definition of "institution of higher education" in section 101 of the *HEA*.

Exhibit 2.9.
Number and percentage of Title IV-eligible postsecondary institutions that offered CTE certificates or associate's degrees, and percentage distribution of students seeking a subbaccalaureate CTE credential, by type of institution, 2011–12

Type of institution	Total number of institutions	Number of institutions offering a CTE subbaccalaureate credential	Percentage of institutions that offered CTE credentials	Percentage distribution of CTE-offering institutions	Percentage distribution of students seeking subbaccalaureate CTE credential
Total	7,234	5,767	80	100	100
4-year institutions	**2,983**	**1,534**	**51**	**27**	**13**
Public	683	342	50	6	5
Private not-for-profit	1,566	634	41	11	2
Private for-profit	734	558	76	10	6
2-year institutions	**2,305**	**2,289**	**99**	**40**	**77**
Public	1,072	1,064	99	19	65
Private not-for-profit	185	181	98	3	1
Private for-profit	1,048	1,044	100	18	11
Less-than-2-year institutions	**1,946**	**1,944**	**100**	**34**	**10**
Public	256	256	100	4	1
Private not-for-profit	79	79	100	1	#
Private for-profit	1,611	1,609	100	28	9

Exhibit reads: In 2011–12, of the 2,983 Title IV-eligible 4-year postsecondary institutions, 1,534 (51 percent) offered CTE certificates or associate's degrees. Four-year institutions accounted for 27 percent of postsecondary institutions that offered CTE subbaccalaureate credentials and 13 percent of students seeking such a credential.

Estimate rounds to zero.

NOTES: Number of institutions offering a CTE credential is based on the number that reported awarding at least one certificate or associate's degree in a CTE field in 2011–12. Detail may not sum to totals due to rounding. For the distribution of students seeking a CTE certificate and the distribution of students seeking a CTE associate's degree, see Exhibit C.9 in Appendix C. For the distribution of credentials *conferred* in CTE fields, see Exhibit D.2 in Appendix D.

SOURCES: U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), 2012 (data on number of institutions); 2011–12 National Postsecondary Student Aid Study (NPSAS:12) (data on distribution of students).

Postsecondary Student Participation

In 2011–12, more than 8 million students were seeking a subbaccalaureate certificate or degree in a CTE field.

Overall, 22.3 million students were enrolled in undergraduate degree or certificate programs, including 11.6 million in subbaccalaureate programs and 10.7 million in bachelor's degree programs. About 38 percent of all undergraduate students reported that they were seeking a certificate or associate's degree in a field that is classified as CTE; an additional 31 percent were seeking a bachelor's degree in a CTE field (Exhibit 2.10). Subbaccalaureate students seeking a credential in a CTE field accounted for 72 percent of all students in subbaccalaureate programs, including 94 percent of those seeking a certificate and 68 percent of those seeking an associate's degree. Among students seeking a bachelor's degree, 64 percent were seeking a degree in a CTE field.

Exhibit 2.10.
Number and percentage of undergraduate students who were seeking a certificate or degree in CTE and non-CTE fields, by type of credential sought, 2011–12

Type of degree or certificate	Number	Percentage
Students enrolled in undergraduate degree or certificate programs	22,288,000	100
Students enrolled in subbaccalaureate programs	11,597,000	52
Seeking credential in CTE field	15,253,000	68
Subbaccalaureate CTE	8,403,000	38
Certificate	1,743,000	8
Associate's degree	6,660,000	30
Bachelor's degree in a CTE field	6,850,000	31
Seeking credential in non-CTE field	6,570,000	29
Certificate	82,000	#
Associate's degree	2,884,000	13
Bachelor's degree	3,605,000	16
Undecided	465,000	2
Certificate	27,000	#
Associate's degree	201,000	1
Bachelor's degree	236,000	1

Exhibit reads: In 2011–12, there were 22.3 million students enrolled in undergraduate degree or certificate programs, and 68 percent of these (15.3 million) were seeking a credential in a CTE field.

Rounds to zero.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS) Institutional Characteristics (IC) Component, 2012; 2011–12 National Postsecondary Student Aid Study (NPSAS:12).

Over half of all credential-seeking undergraduates in subbaccalaureate programs were in the fields of health sciences or business.

Health care fields accounted for 36 percent of the 8.4 million students seeking a subbaccalaureate credential in a CTE field in 2012, and business accounted for 17 percent of subbaccalaureate CTE students. Other CTE fields shown in Exhibit 2.11 each accounted for between 1 and 7 percent of the students.

Exhibit 2.11.
Number and percentage distribution of credential-seeking undergraduates in subbaccalaureate programs, by credential goal and career field of study, 2011–12

CTE occupational field	Number of subbaccalaureate students	Percent of all subbaccalaureate students	Percent seeking a certificate	Percent seeking an associate's degree
Any CTE occupational area	**8,403,000**	**100**	**21**	**79**
Health sciences	3,032,000	36	26	74
Business	1,412,000	17	7	93
Manufacturing, construction, repair, and transportation	592,000	7	42	58
Personal and consumer services	576,000	7	64	36
Military technology and protective services	538,000	6	5	95
Computer and information sciences	533,000	6	10	90
Engineering, architecture, and science technologies	525,000	6	12	88
Education	470,000	6	10	90
Public, legal, and social services	381,000	5	9	91
Communications and design	252,000	3	7	93
Agriculture and natural resources	92,000	1	9	91

Exhibit reads: Of the 8.4 million undergraduates pursuing a subbaccalaureate credential in 2012, 3.0 million (36 percent) were studying health sciences fields; 21 percent of health sciences students were seeking a certificate, and 79 percent were seeking an associate's degree.

NOTES: Business and marketing includes business management, business support, and marketing. Detail may not sum to totals due to rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2011–12 National Postsecondary Student Aid Study (NPSAS:12).

Across all CTE fields, 79 percent of subbaccalaureate undergraduates were seeking an associate's degree, and 21 percent were seeking a certificate. In seven of the CTE fields, 90 percent or more of the students were pursuing an associate's degree: military technology and protective services (95 percent); business (93 percent); communications and design (93 percent); public, legal, and social services (91 percent); agriculture and natural resources (91 percent); and education (90 percent). Two CTE fields had more than 40 percent of their students seeking a certificate: personal and consumer services (64 percent) and manufacturing, construction, repair, and transportation (42 percent).

The number of students earning subbaccalaureate credentials in CTE fields rose 71 percent from 2002 to 2012, compared with a 54 percent increase in all undergraduate awards.

The rate of increase was similar for students who earned a certificate (70 percent) and those who earned a CTE-focused associate's degree (73 percent). Certificates continued to comprise 62 percent of total CTE subbaccalaureate awards in 2012, the same percentage as in 2002. Overall, CTE subbaccalaureate awards rose from 38 percent of all undergraduate awards in 2002 to 42 percent in 2012 (Exhibit 2.12).

Exhibit 2.12.
Change in number of subbaccalaureate CTE awards and other undergraduate awards, 2002 to 2012

Award	2002	2012	% Change
CTE subbaccalaureate awards	938,000	1,601,000	71%
Certificates	583,000	988,000	70%
CTE-focused associate's degrees	355,000	613,000	73%
Other undergraduate awards	1,531,000	2,196,000	43%
Academic associate's degrees	240,000	405,000	69%
Bachelor's degrees	1,292,000	1,791,000	39%
All undergraduate awards	2,469,000	3,796,000	54%
CTE as a percentage of all undergraduate awards	38%	42%	11%
Certificates as a percentage of all CTE subbaccalaureate awards	62%	62%	0%

Exhibit reads: The number of postsecondary students who earned a CTE subbaccalaureate credential rose from 938,000 in 2002 to 1,601,000 in 2012, a 71 percent increase.

NOTE: See Exhibit D.3 in Appendix D for additional years of data as well as unrounded estimates.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), 2002 and 2012.

Some fields showed growth in certificates and associate's degrees in CTE fields (e.g., health sciences), while others showed declines (e.g., marketing).

Over the 10-year period from 2002 to 2012, the change in the number of credentials awarded in CTE fields showed considerable variation across fields. For example, the number of subbaccalaureate CTE credentials awarded in the health sciences field more than doubled, from 268,400 to 635,300 — a 137 percent increase. Similarly, the number of subbaccalaureate awards more than doubled in the fields of protective services (+114 percent) and education (+105 percent). In contrast, there was a decline in the number of credentials awarded in marketing (–44 percent), business support (–23 percent), and computer and information sciences (–21 percent) (Exhibit 2.13).

Exhibit 2.13.
Change in number of subbaccalaureate CTE certificates and associate's degrees awarded, by career field of study, 2002 to 2012

CTE occupational field	2002	2012	Change	% Change
Health sciences	268,400	635,300	366,900	137
Protective services	37,600	80,300	42,700	114
Education	14,100	28,900	14,800	105
Consumer services	108,100	190,600	82,600	76
Manufacturing, construction, repair, and transportation	113,500	196,600	83,000	73
Public, legal, and social services	18,500	31,400	12,900	70
Business management	102,200	149,100	46,900	46
Communications and design	32,000	36,300	4,300	13
Engineering, architecture, and science technologies	72,500	77,600	5,100	7
Agriculture and natural resources	12,900	12,800	–100	–1
Computer and information sciences	85,200	67,400	–17,800	–21
Business support	39,000	30,100	–8,900	–23
Marketing	19,000	10,600	–8,400	–44

Exhibit reads: The number of postsecondary students who earned a CTE subbaccalaureate credential in the health sciences field rose from 268,400 in 2002 to 635,300 in 2012, an increase of 366,900 or 137 percent.

NOTE: See Exhibit D.4 in Appendix D for detail on certificates and associate's degrees as well as unrounded estimates.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), 2002 and 2012.

Characteristics of Postsecondary CTE Students

Certificate seekers tended to be older than students seeking a bachelor's degree and were more likely to be from a lower-income stratum.

In 2011–12, students over the age of 34 accounted for 25 percent of undergraduate students seeking a certificate, compared with 22 percent of those seeking an associate's degree and 12 percent of those seeking an associate's degree. Students from the lowest income quartile accounted for 32 percent of students seeking a certificate, compared with 28 percent of those seeking an associate's degree and 22 percent of those seeking an associate's degree. Students whose parents had not completed high school accounted for higher percentage of students seeking a certificate than of those seeking a bachelor's degree (10 vs. 5 percent), and a similar pattern was found for students whose parents' highest educational attainment was a high school diploma (33 vs. 21 percent).

Hispanic and black students represented a larger proportion of students seeking a certificate (20–22 percent) than they did of those pursuing a bachelor's degree (13–14 percent). Similarly, students seeking a CTE-focused associate's degree also included a relatively high proportion of Hispanic and black students (18–19 percent). Female students accounted for a majority of students for all three types of credentials: they comprised 65 percent of students enrolled in certificate programs, 58 percent of those in CTE-focused associate's degree programs, and 55 percent of students in bachelor's degree programs (Exhibit 2.14).

Exhibit 2.14.
Percentage distribution of undergraduate students enrolled in selected types of degree and certificate programs, by demographic characteristics, 2011–12

Student characteristic	Any certificate	CTE-focused associate's degree	Any bachelor's degree
Age group, as of 2012			
Under 25	45	49	71
25 to 34	30	29	17
Over 34	25	22	12
Income quartile, 2010			
Lowest quartile	32	28	22
Second quartile	28	27	24
Third quartile	20	25	25
Highest quartile	20	21	29
Parent's highest level of education			
Less than high school	10	9	5
High school diploma or equivalent	33	30	21
Some college, no bachelor's degree	25	30	25
Bachelor's degree or higher	24	27	47
Unknown	7	5	2
Race/ethnicity			
Asian	3	4	7
Black or African American	22	19	14
Hispanic or Latino	20	18	13
White	52	54	62
Other	4	5	4
Sex			
Male	35	42	45
Female	65	58	55

Exhibit reads: Among undergraduates pursuing a certificate, 45 percent were under the age of 25, 30 percent were between the ages 25 and 34, and 25 percent were over the age of 34.

NOTES: Other races include American Indians, Alaska Natives, those of two or more races, and those of unspecified races. For income quartiles, parents' income was used if student is dependent; student's own income (and spouse's income, if applicable) is used if student is independent. Income rankings compare a student to other students with the same dependency status. Detail may not sum to 100 percent due to rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2011–12 National Postsecondary Student Aid Study (NPSAS:12).

3

Finance Systems

Perkins IV continues most of the fiscal provisions contained in the *Perkins III* statute. Funds are allocated to states based on a statutory formula, and states generally must distribute at least 85 percent of the funds to secondary and postsecondary subgrantees using formulas that target economically disadvantaged students. States may reserve a portion of the funds for state leadership and administrative activities. To be eligible for *Perkins* funds, subgrantees must qualify for a minimum grant amount ($15,000 for secondary subgrantees and $50,000 for postsecondary subgrantees). If these thresholds are not met, the applicant must form a consortium with one or more other subgrantees, unless it receives a waiver from the state.

Key Findings

- Federal appropriations for *Perkins IV* have fallen since the 2006 reauthorization. Adjusting for inflation, total *Perkins* funding declined by 24 percent from FY 2007 to FY 2014. Declines in allocations for individual states ranged from 6 to 30 percent.
    - Over the longer term, from FY 1985 to FY 2014, the decline in *Perkins* funding amounted to a 32 percent reduction in purchasing power, while total discretionary funding for federal elementary-secondary programs and postsecondary programs more than doubled (with increases of 153 and 133 percent, respectively).
- An increasing number of states are using the reserve option to provide additional funding to subgrantees in rural areas or those serving high numbers or percentages of CTE students, rising from 24 states in FY 2006 to 41 states in FY 2010.
- In FY 2010, states allocated 64 percent of their *Perkins* Title I subgrant funds to secondary school programs and 36 percent to postsecondary programs, on average, about the same proportions as in FY 2001. However, states varied widely in the share of funds they allocated to secondary school programs, ranging from 38 percent in California to 88 percent in Ohio.
    - High-poverty school districts received larger allocations per secondary student in 2009–10 than lower-poverty districts. However, they received smaller allocations per poor school-age child (ages 5–17) than lower-poverty school districts.
    - School districts located in cities received larger allocations per secondary student than those located in suburbs, towns, and rural areas. However, school districts in towns and rural areas received larger allocations per poor school-age child than urban and suburban districts.
    - Over three-fourths (77 percent) of *Perkins* postsecondary funds were allocated to public 2-year institutions.
- Almost two-thirds of all states reported funding consortia at the secondary level; states less frequently reported providing waivers of the minimum allocation rule. Both consortia and waivers were less common at the postsecondary level than at the secondary level.
    - The number of subgrantees participating in consortia varied widely across states, ranging from two to 554 at the secondary level and from two to 50 at the postsecondary level.
    - States were most likely to waive the minimum allocation rule for LEAs serving sparsely populated areas.
- In 2008–09, subgrantees most frequently reported using *Perkins* funds for equipment and to provide career guidance and academic counseling to students.

Statutory Provisions for Allocating Funds Under *Perkins IV*

Most *Perkins* funds are allocated through Title I basic grants, which states primarily use to make subgrants to school districts, postsecondary institutions, and other eligible subgrantees, after reserving some of the funds to support state-level activities.[22] *Perkins IV* also authorized Title II grants to support Tech Prep Education that integrates academic and career and technical education instruction; however, Congress discontinued funding for Tech Prep beginning in FY 2011, and the *Perkins IV* authorization for Tech Prep has since expired.

Perkins IV employs essentially the same resource distribution provisions as in the preceding law. The statutory reservation for outlying areas was reduced slightly, from 0.2 to 0.13 percent of Title I funds (because two outlying areas, Marshall Islands and Micronesia, were no longer eligible to participate, under the terms of their renewed compacts). A change in the state minimum allocation provision would direct additional funds to small states, but the provision is applicable only in years in which Title I appropriations exceed the FY 2006 funding level, which has not occurred as of FY 2014; as a result, this formula change has not taken effect.

Each state must designate a state agency as its "eligible agency" to be responsible for the administration of career and technical education. The eligible agency determines how *Perkins* funds are allocated to subgrantees as well as how funds are used for state-level activities.

Allocations to States

The U.S. Department of Education allocates Title I funds to the 50 states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands using a statutory formula that is based on states' share of the national population within each of three age groups (15–19, 20–24, and 25–65) and also incorporates an "allotment ratio" based on average per capita income relative to other states. This formula is designed to favor states with larger populations in the 15–19 age group as well as states with lower per capita income levels. The formula includes a hold harmless provision that limits the amount of funds that a state can lose due to relative changes in population, per capita income, or other factors, and also includes a state minimum provision that increases the size of allocations for small states.

Within-State Allocations

States generally must distribute at least 85 percent of their Title I allocations to local recipients for secondary and postsecondary programs and are permitted to expend up to 15 percent of their allocations for state-level activities and administration. States have the flexibility to determine how much of the funds they allocate to secondary education and how much they allocate to postsecondary education.

State reservations for state-level activities

First, states may reserve up to 10 percent of their Title I grant for state leadership activities. States must earmark a portion of their leadership funds to serve individuals in state institutions, which

[22] Title I funds are allocated to states after certain funds are set aside for grants to certain outlying areas (U.S. Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, and the Freely Associated States), as well as for Native American programs, Native Hawaiian programs, tribally controlled postsecondary and career and technical institutions, and national activities. Title I also includes an authorization for an occupational and employment information system, but funds have not been appropriated for this purpose.

include correctional facilities and facilities serving individuals with disabilities (no more than 1 percent of a state's Title I grant). States must also reserve between $60,000 and $150,000 of their leadership funds for services that prepare individuals for nontraditional fields (those in which individuals from one gender comprise less than 25 percent of the individuals employed in the occupation or field of work). In addition to these two specific uses, the statute also identifies nine required uses and 17 permissible uses of state leadership funds.

Second, states may use up to 5 percent or $250,000 of their Title I funds (whichever is greater) for administration of the state plan. These funds may be used for developing the state plan; reviewing local plans; monitoring and evaluating program effectiveness; ensuring compliance with federal law; providing technical assistance; and supporting and developing state data systems relevant to the statute.

State reserve option for funding certain high-need subgrantees

Of the funds that states allocate to local subgrantees (generally at least 85 percent of their total allocation), states may reserve up to 10 percent of their allocation to provide funding for subgrantees in rural areas or in areas with high numbers or percentages of CTE students. The statute does not specify how states are to allocate these reserve funds to eligible recipients.

State suballocations to secondary education providers

In suballocating funds to secondary education providers, states must follow a statutory formula that targets a greater share of the funds to school districts with higher poverty level. Specifically, the formula allocates 70 percent of the funds based on the proportion of the state's total number of poor children ages 5–17 who reside in each school district and 30 percent based on total population ages 5–17.

State suballocations to postsecondary education providers

States allocate funds to eligible postsecondary institutions[23] based on the number of recipients of Pell Grants and Bureau of Indian Affairs assistance they enroll in CTE programs, relative to the statewide total. Because funding is based on the number of students enrolled in CTE who are economically disadvantaged, the distribution of postsecondary allocations is directly associated with the level of student participation in CTE, unlike the secondary allocations.

Alternative distribution methods

Perkins IV offers states two options for distributing Title I funds to local subgrantees through means other than the statutory formulas: the waiver for more equitable distribution and the special rule for minimal allocation. The waiver for more equitable distribution allows states to request a waiver to use an alternative formula that will more effectively target resources on the basis of poverty (at the secondary level) or to postsecondary institutions or consortia with the highest numbers of economically disadvantaged students. The special rule for minimal allocation permits states allocating 15 percent or less to either the secondary or postsecondary level to distribute funds for that level either on a competitive basis or by an alternative method determined by the eligible agency.

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[23] Eligible postsecondary institutions include: (A) a public or nonprofit private institution of higher education that offers CTE courses that lead to technical skill proficiency, an industry-recognized credential, a certificate, or a degree; (B) a local educational agency providing education at the postsecondary level; (C) an area CTE school providing education at the postsecondary level; (D) a postsecondary educational institution controlled by the Bureau of Indian Affairs or operated by or on behalf of any Indian tribe that is eligible to contract with the Secretary of the Interior for the administration of programs under the Indian Self-Determination and Education Assistance Act; (E) an educational service agency; or (F) a consortium of two or more of the above entities.

Secondary and postsecondary consortia

To be eligible for *Perkins* funds, secondary subgrantees must qualify for a minimum grant of $15,000, and postsecondary subgrantees must qualify for a $50,000 grant. If these thresholds are not met, the applicant must form a consortium with one or more other subgrantees, unless it receives a waiver from the state. States may grant consortia waivers to LEAs or postsecondary institutions that are located in rural, sparsely populated areas and to LEAs that are public charter schools or that demonstrate that they are unable to enter into a consortium to provide CTE.

Federal Funding Over Time

Federal appropriations for *Perkins IV* have fallen since the 2006 reauthorization.

For the first 20 years of the *Perkins Act*, from FY 1985 through FY 2004, funding remained relatively stable in terms of inflation-adjusted dollars. Total *Perkins* funding in FY 2004 ($1.65 billion in constant 2014 dollars) was about the same as in FY 1985 ($1.64 billion). However, by FY 2007, funding had declined to $1.47 billion (in 2014 dollars), and appropriations continued declining steadily to the current level of $1.12 billion in FY 2014 (Exhibit 3.1).

Exhibit 3.1.
Federal appropriations for CTE from FY 1985 through FY 2014, in constant 2014 dollars

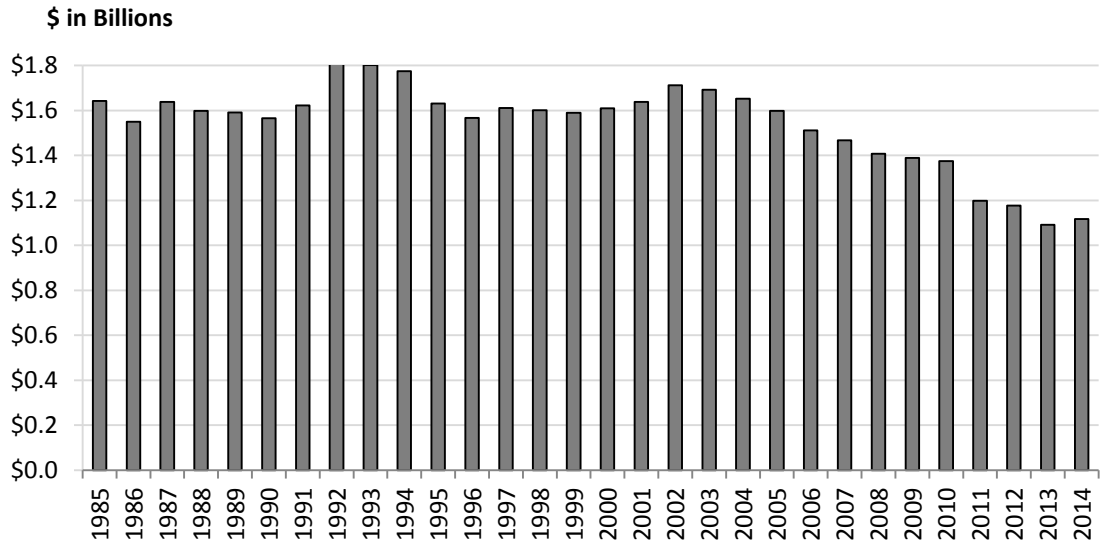

Exhibit reads: In constant 2014 dollars, federal funding for CTE programs was lower in FY 2014 than in FY 1985.

NOTE: See Exhibit D.5 in Appendix D for annual appropriations figures in nominal and constant dollars.
SOURCES: U.S. Department of Education, Budget History Table, http://www2.ed.gov/about/overview/budget/history/edhistory.pdf, and Bureau of Labor Statistics, Inflation Calculator, http://data.bls.gov/cgi-bin/cpicalc.pl (accessed June 19, 2014).

From FY 1985 to FY 2014, the decline in *Perkins* funding amounted to a 32 percent reduction in purchasing power, while total discretionary funding for federal elementary and secondary education programs and postsecondary education programs more than doubled.

Measured in constant FY 2014 dollars, total *Perkins* funding declined from $1.6 billion in FY 1985 to $1.1 billion in FY 2014 — a 32 percent reduction in purchasing power. In contrast, total appropriations for federal elementary and secondary education programs administered by the U.S. Department of Education (which include *Perkins*) increased from $14.7 billion in FY 1985 to $37.2 billion in FY 2014. Similarly, discretionary funding for postsecondary education programs increased from $11.5 billion in FY 1985 to $26.8 billion in FY 2014 (Exhibit 3.2). The increases in total discretionary funding for elementary-secondary programs and postsecondary programs corresponded to increases in purchasing power of 153 percent and 133 percent, respectively.

Exhibit 3.2.
Federal appropriations for CTE compared with total discretionary funding for elementary-secondary and postsecondary education programs, for selected fiscal years from FY 1985 through FY 2014, in constant 2014 dollars

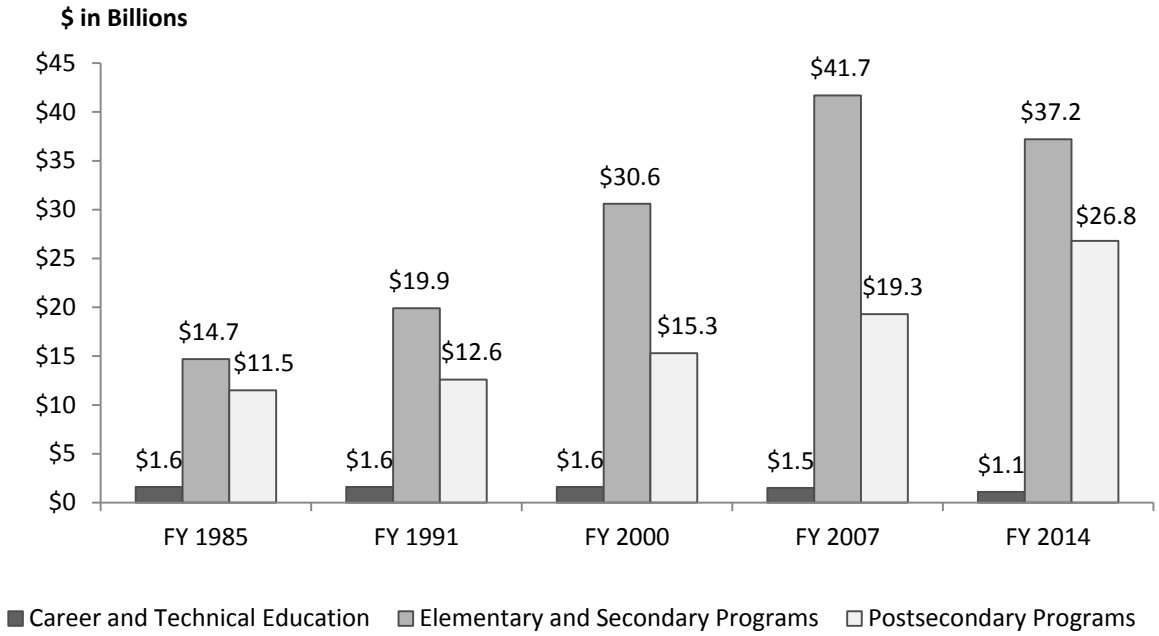

Exhibit reads: In constant 2014 dollars, federal appropriations for *Perkins* CTE grants in FY 1985 were $1.6 billion, compared with $14.7 billion in total discretionary funding for all federal elementary and secondary education programs and $11.5 billion for postsecondary education programs.

NOTES: The first four years presented in this exhibit represent the first appropriations year after the passage of *Perkins I* through *Perkins IV*. Specific programs that received federal appropriations varied by year. See Exhibit D.6 in Appendix D for unrounded appropriations figures in both nominal and constant dollars.
SOURCES: U.S. Department of Education, Budget History Table, http://www2.ed.gov/about/overview/budget/history/index.html, and Bureau of Labor Statistics, Inflation Calculator, http://data.bls.gov/cgi-bin/cpicalc.pl (accessed June 19, 2014).

In 2004, the National Assessment of Vocational Education reported that despite declines in the *Perkins* share of total federal education funding, *Perkins* was still the largest single source of federal education funds used to support high schools (Silverberg et al. 2004). However, by FY 2014, with continued growth in *ESEA* Title I funding and declining funding for *Perkins* (in constant 2014 dollars), the estimated amount that *Perkins* provides to high schools is now less than that provided through *ESEA* Title I (Exhibit 3.3).

Exhibit 3.3.
Estimated spending on high schools from *Perkins* funds and from *ESEA* Title I funds, FY 2001 and FY 2014, in constant 2014 dollars

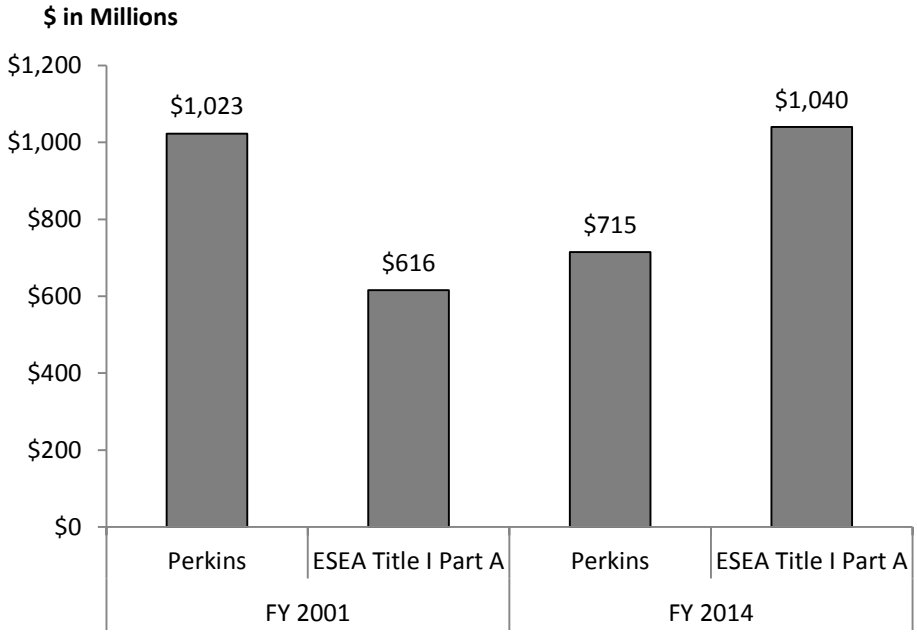

Exhibit reads: In FY 2001, *Perkins* grants provided an estimated $1.023 billion (in constant 2014 dollars) to support high school education, while *ESEA* Title I Part A provided an estimated $616 million.

SOURCES: FY 2001 data are from Silverberg et al. 2004, adjusted to 2014 dollars. FY 2014 data are from an internal NACTE analysis conducted by the Policy and Program Studies Service based on the assumptions that all *Perkins* funds allocated to the secondary level (64 percent) are for the benefit of high school students and that 7.2 percent of ESEA Title I Part A funds are allocated to high schools.

Declines in *Perkins* allocations for individual states from FY 2007 to FY 2014, in constant dollars, ranged from 6 to 30 percent.

Since the 2006 reauthorization, total *Perkins* grants to states have declined, both in nominal dollars and constant dollars, from FY 2007 through FY 2014 (a 13 percent decline in nominal dollars and a 23 percent decline in constant dollars). The reductions in funding for individual states, in terms of constant dollars, ranged from a low of 6 percent in Nevada to a high of 30 percent in New Mexico and New York. Ten states experienced reductions of less than 20 percent, 27 states had reductions of 20–25 percent, and 13 states had reductions of more than 25 percent (Exhibit 3.4).

Over a longer timeframe from FY 2000 to FY 2014, the reduction in total *Perkins* grants to states was smaller in nominal dollars (4 percent) but larger in constant dollars (29 percent). One state saw a constant-dollar funding increase over this period (14 percent in Nevada), four states saw funding

reductions between 14 and 18 percent, and 46 states saw funding reductions between 23 and 37 percent.

Exhibit 3.4.
Total *Perkins* state grants (Title I and Title II) in FY 2000, FY 2007, and FY 2014, and percentage change from FY 2000 to FY 2014 and from FY 2007 to FY 2014, in constant 2014 dollars, by state

State/jurisdiction	*Perkins III* FY 2000	*Perkins IV* FY 2007	*Perkins IV* FY 2014	% Change FY 2000–FY 2014	% Change FY 2007–FY 2014
Total	$1,573,848,387	$1,456,428,003	$1,117,598,000	–29	–23
Alabama	29,052,294	24,649,209	19,175,065	–34	–22
Alaska	6,216,446	5,180,954	4,214,921	–32	–19
Arizona	28,896,929	30,601,637	24,934,607	–14	–19
Arkansas	17,408,270	15,560,721	11,403,795	–34	–27
California	169,217,886	159,393,453	122,943,598	–27	–23
Colorado	20,574,154	19,542,527	15,944,320	–23	–18
Connecticut	12,762,238	12,617,536	9,466,507	–26	–25
Delaware	6,394,511	6,065,416	4,720,975	–26	–22
District of Columbia	6,121,393	5,122,588	4,214,921	–31	–18
Florida	74,754,655	78,621,912	61,726,876	–17	–21
Georgia	44,930,163	46,478,617	38,240,445	–15	–18
Hawaii	7,747,672	7,173,107	5,496,906	–29	–23
Idaho	9,454,606	8,468,388	6,376,981	–33	–25
Illinois	59,278,368	55,668,240	40,519,069	–32	–27
Indiana	35,893,085	32,082,774	24,843,250	–31	–23
Iowa	18,010,410	15,166,467	11,963,946	–34	–21
Kansas	16,183,471	14,042,149	10,245,408	–37	–27
Kentucky	26,849,738	22,559,736	17,905,647	–33	–21
Louisiana	31,989,238	26,987,625	21,041,943	–34	–22
Maine	7,747,672	7,175,531	5,496,906	–29	–23
Maryland	22,684,470	20,900,169	15,289,772	–33	–27
Massachusetts	25,724,804	22,692,888	17,766,415	–31	–22
Michigan	55,158,703	49,185,353	37,280,167	–32	–24
Minnesota	25,657,896	22,544,651	16,684,637	–35	–26
Mississippi	20,255,022	17,203,008	13,363,550	–34	–22
Missouri	32,483,908	29,530,273	21,433,742	–34	–27
Montana	7,547,869	6,849,515	5,179,103	–31	–24
Nebraska	10,421,181	8,821,357	6,816,893	–35	–23
Nevada	8,456,199	10,293,941	9,650,599	14	–6
New Hampshire	7,747,672	7,173,107	5,496,906	–29	–23
New Jersey	32,304,900	30,823,993	22,370,715	–31	–27
New Mexico	12,370,424	11,475,082	8,028,679	–35	–30
New York	76,695,124	73,423,875	51,368,505	–33	–30
North Carolina	43,542,627	43,266,515	35,695,795	–18	–17
North Dakota	6,212,834	5,155,673	4,214,921	–32	–18
Ohio	64,925,998	56,790,964	42,750,001	–34	–25
Oklahoma	23,537,551	19,566,303	15,094,180	–36	–23
Oregon	19,119,491	17,752,919	13,448,245	–30	–24
Pennsylvania	61,516,294	56,315,986	40,722,778	–34	–28
Rhode Island	7,747,672	7,173,107	5,496,906	–29	–23
South Carolina	25,658,528	23,416,514	18,310,739	–29	–22
South Dakota	6,283,574	5,467,843	4,214,921	–33	–23
Tennessee	32,605,585	29,739,734	23,042,024	–29	–23
Texas	122,933,052	117,558,513	92,014,058	–25	–22
Utah	18,160,917	15,684,958	12,274,340	–32	–22

Exhibit 3.4 (continued).
Total *Perkins* state grants (Title I and Title II) in FY 2000, FY 2007, and FY 2014, and percentage change from FY 2000 to FY 2014 and from FY 2007 to FY 2014, in constant 2014 dollars, by state

State/jurisdiction	*Perkins III* FY 2000	*Perkins IV* FY 2007	*Perkins IV* FY 2014	% Change FY 2000–FY 2014	% Change FY 2007–FY 2014
Vermont	6,191,633	5,159,437	4,214,921	–32	–18
Virginia	35,405,560	32,102,121	23,634,248	–33	–26
Washington	30,196,216	28,438,803	20,736,066	–31	–27
West Virginia	12,607,976	10,536,649	8,428,617	–33	–20
Wisconsin	31,337,062	27,412,331	20,241,685	–35	–26
Wyoming	6,097,865	5,085,934	4,214,921	–31	–17
American Samoa	257,419	396,290	334,544	30	–16
Guam	677,419	747,289	630,855	–7	–16
Northern Mariana Islands	257,419	396,290	334,544	30	–16
Puerto Rico	27,611,187	23,152,373	18,458,484	–33	–20
Virgin Islands	851,393	769,045	567,534	–33	–26
Freely Associated States	0	181,161	152,934	NA	–16
Native American programs	17,877,944	16,722,761	13,969,975	–22	–16
Other allocations	5,243,802	3,362,690	2,793,995	–47	–17

NOTE: See Exhibit D.7 in Appendix D for allocations figures in both nominal and constant dollars.
SOURCES: U.S. Department of Education, State Funding History Tables, http://www2.ed.gov/about/overview/budget/history/index.html, and Bureau of Labor Statistics, Inflation Calculator, http://data.bls.gov/cgi-bin/cpicalc.pl (accessed June 19, 2014).

State Eligible Agencies

A majority of grantees — 40 of the 55 states and jurisdictions for which information was available — assigned *Perkins IV* oversight to their K–12 education agencies. Nine states chose a postsecondary system office or institution to serve in this role, and six states chose a separate state department of CTE or workforce development agency.[24]

State Set-Asides

State Administration

About half of the states make full use of the state administration provision to offset the staffing and other costs associated with grant administration. In FY 2010, 24 states reserved the maximum amount available for state administrative activities, and most of the remaining states reserved between 4.5 and 4.9 percent (22 states). Five states reserved smaller amounts, ranging from 1.8 percent in Indiana to 3.3 percent in Texas (see Exhibit D.8 in Appendix D).

In FY 2010, 19 states reported providing state matching funds for state administration that were greater than the amount they reserved from their *Perkins* allocation. Thirty states reported contributing state funds equal to the matching requirement, and one state (New Hampshire) reported providing state funds that were less than the amount it reported reserving from its *Perkins* allocation (see Exhibit D.8).

[24] http://www.careertech.org/cte-your-state (accessed August 27, 2014).

State Leadership

Most states reported reserving the maximum amount permitted for state leadership activities. In FY 2010, 42 states reported reserving 10 percent of their allocation for this purpose, with the remainder allocating between 5 and 9 percent (Klein et al. 2014).

Nontraditional employment

In FY 2010, states spent an average of $80,983 on services to prepare individuals for nontraditional fields (those in which individuals from one gender comprise less than 25 percent of the individuals employed in the occupation or field of work), down from an average of $91,500 in FY 2006, a decline of roughly 11 percent in nominal dollars. Although *Perkins III* discontinued a previous requirement for states to have a gender equity coordinator, many states continue to have staff designated to coordinate such activities (29 states at secondary level and 19 states at the postsecondary level) (Klein et al. 2014).

Individuals in state institutions

In both FY 2006 and FY 2010, states reserved 0.8 percent of their Title I funds, on average, for services to individuals in state institutions, which include correctional facilities and facilities serving individuals with disabilities (Klein et al. 2014).

Reserve Option for Funding Certain High-Need Subgrantees

An increasing number of states are using the reserve option to provide additional funding to subgrantees in rural areas or those serving high numbers or percentages of CTE students, rising from 24 states in FY 2006 to 41 states in FY 2010.

States may reserve up to 10 percent of their allocation to provide additional funding to subgrantees in rural areas or those serving high numbers or percentages of CTE students. Among the 41 states using this option in FY 2010, 21 reported reserving the maximum amount and 20 reported reserving less than 10 percent. In FY 2010, 14 states allocated all of these reserve funds to the secondary level, five states allocated all of these funds to the postsecondary level, and 22 states allocated these funds to both levels; on average, states allocated 63 percent of these reserve funds to the secondary level.

Exhibit 3.5.
Number of states using reserve option to fund certain high-need subgrantees, FY 2006 and FY 2010

Number of states	FY 2006*	FY 2010
States using the reserve option	24	41
States reserving the maximum amount (10 percent)	10	21
States reserving less than the maximum allowed	14	20
States allocating all reserve funds to secondary level	13	14
States allocating all reserve funds to postsecondary level	2	5
States allocating reserve funds to both secondary and postsecondary levels	6	22

Exhibit reads: In FY 2006, 24 states used the reserve option to provide additional funding for certain high-need subgrantees, including 10 states that reserved the maximum amount and 14 states that reserved less than the maximum allowed.

*In FY 2006, three states using the reserve option did not report on the amount suballocated to each level.
SOURCE: *Perkins* Consolidated Annual Reports for FY 2006 and FY 2010 (*n* = 51).

In states using this option, the average amount reserved in both FY 2001 and FY 2010 was 8 percent, but the total amount of reserve funds reported by states grew from $34 million in FY 2006 to $52 million in FY 2010 (Exhibit 3.5), due to the larger number of states using this option. States most often reported using the reserve fund to encourage innovation or allocate additional funds to local subgrantees based on their need relative to others in the state (Klein et al. 2014).

Secondary and Postsecondary Distributions

On average, states allocated nearly two-thirds of their *Perkins* subgrant funds to secondary school programs and one-third to postsecondary programs. However, states varied widely in the share of funds they allocated to secondary school programs, ranging from 38 percent in California to 88 percent in Ohio.

In FY 2010, states allocated an average of 64 percent of their Title I local subgrant funds to the secondary level; 11 states allocated 80 percent or more of the funds to secondary subgrantees, while five states allocated less than half of the funds to the secondary level (Exhibit 3.6).

Exhibit 3.6.
Percentage of *Perkins* Title I local funds that states allocated to the secondary level in FY 2010, by state

80–88%	70–79%	60–69%	50–59%	38–49%
11 states	**7 states**	**13 states**	**15 states**	**5 states**
Alaska	Arkansas	Alabama	Florida	California
Arizona	Massachusetts	Idaho	Georgia	Colorado
Connecticut	Missouri	Illinois	Hawaii	Minnesota (+)
Delaware	Pennsylvania	Indiana	Iowa (–)	Washington
District of Columbia	Texas (+)	Maryland	Kansas (–)	Wisconsin
New Hampshire	Vermont	Michigan	Kentucky (+)	
Ohio (+)	West Virginia (–)	Montana	Louisiana	
Oklahoma		Nevada	Maine	
Rhode Island		North Carolina	Mississippi	
Tennessee		North Dakota	Nebraska	
Virginia		South Carolina (–)	New Jersey (–)	
		Utah	New Mexico (+)	
		Wyoming	New York	
			Oregon	
			South Dakota (+)	

Exhibit reads: In FY 2010, 11 states allocated between 80–88 percent of *Perkins* Title I subgrant funds to the secondary level.

NOTE: "(+)" indicates that secondary share increased by more than 5 percentage points from FY 2001 to FY 2010, and "(–)"indicates that secondary share decreased by more than 5 percentage points.
SOURCE: *Perkins* Consolidated Annual Reports for FY 2010 (*n* = 51).

Overall, the share of funds that states allocated to the secondary level in FY 2010 (64 percent) was about the same as in FY 2001 (63 percent). Of the 44 states for which data for both years were available, the secondary share changed by no more than 5 percentage points in 33 states, with 13 states showing changes of 1 percent or less. Six states increased the proportion of funds flowing to the secondary level by 6–14 percentage points, while five states reduced the secondary share by 6–15 percentage points (see Exhibit D.9 in Appendix D).

Allocation of Funds at the Secondary Level

With few exceptions, states approved nearly all applications for secondary subgrants submitted for the 2008–09 program year; the 45 states that provided these data reported approving all but 26 of the 4,060 applications they received for an approval rate of 99 percent. State secondary CTE directors reported working closely with subgrant applicants to improve applications that did not initially meet *Perkins* requirements. Three of the 45 responding state directors reported that they disapproved one or more funding applications, with one state accounting for 23 of the 26 disapproved applications. The reasons cited for disapproval included failure to provide an adequate plan for allocating funds and collecting accountability data, failure to provide past accountability data, poor past performance, insufficient program quality, and inability or unwillingness to join a consortium (Klein et al. 2014).

High-poverty school districts received larger allocations per secondary student than did lower-poverty districts.

In 2009–10, school districts in the highest poverty quartile received an average *Perkins* Title I allocation of $48 per secondary student compared with $16 per secondary student in the lowest-poverty quartile of districts (Exhibit 3.7). However, the highest-poverty districts received smaller allocations per poor school-age child (ages 5–17) than did lower-poverty school districts.

Exhibit 3.7.
Average *Perkins* Title I secondary allocation per student and per poor school-age child received by school districts, overall and by district poverty quartile and by urbanicity, 2009–10

Curricular area	Average allocation per secondary student	Average allocation per poor child aged 5–17
All districts	$29	$50
Highest poverty quartile	48	42
Second highest poverty quartile	31	52
Second lowest poverty quartile	23	57
Lowest poverty quartile	16	70
City	37	51
Suburban	22	46
Town	32	55
Rural	29	54

Exhibit reads: In 2009–10, school districts that received *Perkins* Title I secondary subgrants received, on average, $29 per secondary student and $50 per poor school-age child.

NOTES: The first column displays funding per secondary student (grades 7–12) because most take at least one vocational education course; this can be viewed as funding per potential participant in secondary vocational education. The second column displays funding per poor school-age child (ages 5–17) because *Perkins* funds are allocated in part based on census poverty data. Analysis is based on *Perkins* suballocation data reported by secondary state directors in 49 states and the District of Columbia (Delaware did not report these data). The analysis excludes local secondary subgrantees for which Census population and poverty data were not available. Poverty quartiles were determined based on Census Bureau data on the percentage of school-age students residing within a district who were living in poverty in 2010. Highest poverty quartile = 26.627 to 100 percent poverty; second highest poverty quartile = 18.9847 to 26.626 percent; second lowest poverty quartile = 11.542 to 18.9846 percent; lowest poverty quartile = 0 to 11.541 percent. Urbanicity classifications are from the NCES Common Core of Data.

SOURCE: U.S. Department of Education, Office of Planning, Evaluation and Policy Development, Policy and Program Studies Service, 2014. Analysis of *Perkins* Title I allocations to school districts based on data from NACTE Secondary State Director Survey Fiscal Data, 2009; National Center for Education Statistics (NCES) Common Core of Data (CCD) Local Education Agency Universe Survey: School Year 2009–10; NCES CCD Elementary/Secondary School Universe Survey: School Year 2009–10 and Census Bureau, Small Area Poverty Estimates, 2010 (n = 9,423).

The share of funds allocated to school districts in the highest poverty quartile (36 percent) was greater than their share of all school-age children (25 percent) though less than their share of poor children (43 percent). School districts in the highest poverty quartile accounted for 22 percent of all school district subgrantees, slightly larger than their proportion of all school districts with secondary grades (20 percent) (Exhibit 3.8).

Exhibit 3.8.
Percentage distribution of *Perkins* Title I secondary funds allocated to school districts, and distribution of school district subgrantees, by district poverty quartile, 2009–10

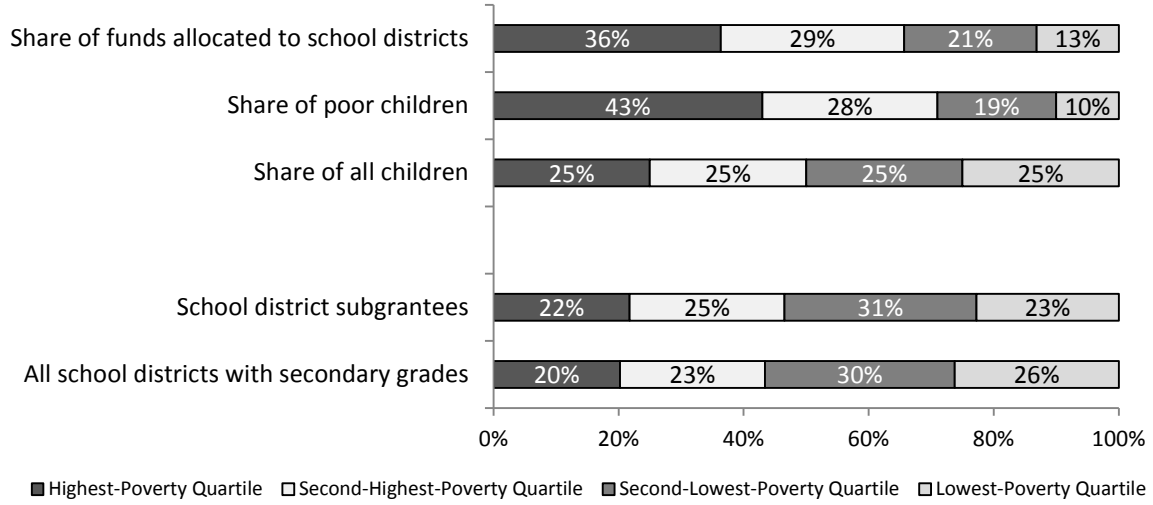

Exhibit reads: In 2009–10, the highest poverty quartile of school districts received 36 percent of all *Perkins* Title I funds that were allocated to school districts, which was less than their share of poor school-age children (43 percent) but greater than their share of all school-age children (25 percent). The highest poverty quartile accounted for 22 percent of all school districts that received *Perkins* Title I funds, which is slightly higher than their proportion of all school districts with secondary grades (20 percent).

NOTES: Analysis of *Perkins* Title I allocations to school districts is based on data reported by secondary state directors in 49 states and the District of Columbia (Delaware did not report allocation data). The analysis excludes local secondary subgrantees for which Census population and poverty data were not available. Poverty quartiles were determined based on Census Bureau data on the percentage of school-age students residing within a school district who were living in poverty in 2010. Highest poverty quartile = 26.627 to 100 percent poverty; second highest poverty quartile = 18.9847 to 26.626 percent; second lowest poverty quartile = 11.542 to 18.9846 percent; lowest poverty quartile = 0 to 11.541 percent. Detail may not sum to 100 percent due to rounding.

SOURCE: NACTE Secondary State Director Survey Fiscal Data, 2009; National Center for Education Statistics (NCES) Common Core of Data (CCD) Elementary/Secondary School Universe Survey: School Year 2007–08; and Census Bureau, Small Area Poverty Estimates, 2010 (*n* = 13,328).

School districts located in cities received larger allocations per secondary student than did those located in suburbs, towns, and rural areas. However, school districts in towns and rural areas received larger allocations per po`or school-age child than did urban and suburban districts.

In 2009–10, school districts located in cities received an average *Perkins* Title I allocation of $37 per secondary student compared with $32 per secondary student in school districts located in towns, $29 in rural districts, and $22 in suburban districts. However, when examined in terms of funding per poor school-age child, the largest average allocations were received by town and rural school districts ($55 and $54 per poor child, respectively), followed by urban districts ($51 per poor child). Suburban districts received the smallest average allocation per poor child ($46) (see Exhibit 3.7).

Rural districts received a share of total school district allocations (19 percent) that was greater than their share of school-age children (7 percent) and poor children (18 percent). Urban districts received funding that was equivalent to their share of poor children (39 percent) and greater than their share of all school-age children (31 percent). Town districts received a share of funding (13 percent) that was similar to their share of school-age children and poor children (12 percent). Suburban districts received a share of funding (28 percent) that was less than their share of school-age children (38 percent) and poor children (31 percent) (Exhibit 3.9).

Exhibit 3.9.
Percentage distribution of *Perkins* Title I secondary funds allocated to school districts, and distribution of school district subgrantees, by district urbanicity, 2009–10

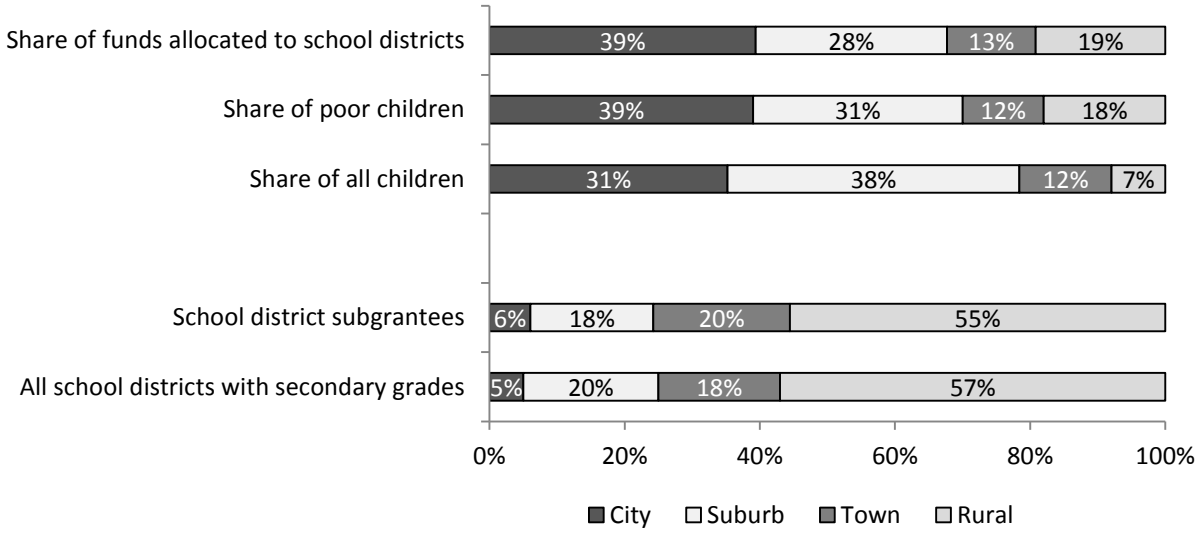

Exhibit reads: In 2009–10, urban school districts received 39 percent of all *Perkins* Title I funds that were allocated to school districts, which was about the same as their share of poor school-age children (39 percent) but greater than their share of all school-age children (31 percent). Urban districts accounted for 6 percent of all school districts that received *Perkins* Title I funds, which was slightly larger than their proportion of all school districts with secondary grades (5 percent).

NOTES: Analysis of *Perkins* Title I allocations to school districts is based on data reported by secondary state directors in 49 states and the District of Columbia (Delaware did not report allocation data). The analysis excludes local secondary subgrantees for which Census population and poverty data were not available. Urbanicity classifications are from the NCES Common Core of Data. Detail may not sum to 100 percent due to rounding.

SOURCE: NACTE Secondary State Director Survey Fiscal Data, 2009; National Center for Education Statistics (NCES) Common Core of Data (CCD) Local Education Agency Universe Survey: School Year 2005–06; NCES CCD Elementary/Secondary School Universe Survey: School Year 2007–08 and Census Bureau, Small Area Poverty Estimates, 2010 (*n* = 13,328).

Allocation of Funds at the Postsecondary Level

As at the secondary level, states approved nearly all applications submitted for postsecondary subgrants. According to state postsecondary CTE directors, all but two of the 1,179 applications submitted were approved in the 2008–09 program year, either as originally submitted or after revision and resubmission (Klein et al. 2014). The very small number of rejected applications in 2008–09 is similar to that reported in the 2000–01 program year, when only three states rejected one or more postsecondary subgrant applications (Silverberg et al. 2004).

In both *Perkins III* and *Perkins IV*, the special rule for minimal allocation permits states allocating 15 percent or less to either the secondary or postsecondary level to distribute these funds on a competitive basis or by an alternative method determined by the eligible agency. Seven states used this alternative distribution strategy at the postsecondary level in FY 2010 (Alaska, Arizona, Delaware, Ohio, Oklahoma, Rhode Island, and Tennessee) (Klein et al. 2014).

Over three-fourths (77 percent) of *Perkins* postsecondary funds were allocated to public 2-year institutions.

In 2009–10, 86 percent of postsecondary subgrantees were public or nonprofit IHEs, and these institutions accounted for 96 percent of Title I funds distributed at the postsecondary level. Postsecondary programs offered to adults in non-IHE settings, such as in secondary schools in LEAs, accounted for the remaining funds. While a range of postsecondary institution types received *Perkins* funds, the majority of these funds were allocated to public 2-year institutions (community colleges), which received 77 percent of *Perkins* postsecondary subgrant funds. Most of the remaining funds went to public 4-year institutions (9 percent) and administrative units that serve multi-campus college systems (also 9 percent). Private nonprofit institutions received less than 2 percent of the funds (Exhibit 3.10).

Exhibit 3.10.
Percentage of *Perkins* Title I postsecondary subgrantees and local funds, by institution type, 2009–10

Institution type	Percentage of *Perkins* Title I postsecondary subgrantees	Percentage of *Perkins* Title I postsecondary local funds
Institutions of higher education (IHEs)	86	96
Public 2-year	71	77
Public 4-year	9	9
Public less-than-2-year	3	1
Administrative units[b]	2	9
Private nonprofit 2-year	1	1
Private nonprofit 4-year	1	<1
Programs for adults in non-IHE settings[a]	14	4

Exhibit reads: Institutions of higher education accounted for 86 percent of Title I local postsecondary subgrantees in 2009–10 and received 96 percent of Title I postsecondary local funds.

[a] The majority of non-IHE postsecondary subgrantees were area CTE centers that also served secondary students, such as Boards of Cooperative Educational Services (BOCES) in New York.
[b] Administrative units are offices for multi-campus college systems.
SOURCE: NACTE Postsecondary State Director Survey Fiscal Data, 2009 (*n* = 50).

Minimum Allocation Rule and Consortia Provision

Eligible local entities that do not meet the minimum grant requirement ($15,000 for secondary subgrants and $50,000 for postsecondary subgrants) may enter into a consortium with one or more other subgrantees or apply for a waiver from the state agency.

Almost two-thirds of all states reported funding *Perkins* consortia at the secondary level; states less frequently reported providing waivers of the minimum allocation rule. Both consortia and waivers were less common at the postsecondary level than at the secondary level.

In 2009–10, 32 of the 50 states that submitted secondary fiscal data reported funding at least one secondary consortium, and 22 states funded 10 or more secondary consortia; 10 states funded consortia at the postsecondary level. A total of 5,570 LEAs participated in 706 consortia (Exhibit 3.11), accounting for over half (59 percent) of all LEAs participating in *Perkins* Title I. At the postsecondary level, there were 191 IHEs participating in 78 consortia (see Exhibit 3.12), accounting for 20 percent of all participating IHEs. Consortia accounted for 17 percent of subgrantees at the secondary level and 11 percent at the postsecondary level (Klein et al. 2014).

Based on the 2008–09 surveys of state CTE directors, 22 states granted secondary waivers and two states granted postsecondary waivers (Klein et al. 2014).

The number of subgrantees participating in consortia varied widely across states, ranging from two to 554 at the secondary level and from two to 50 at the postsecondary level.

At the secondary level, five states reported having just one consortia in 2009–10 (New Jersey, Tennessee, Utah, Virginia, and Washington), while five states reported having more than 50 (Illinois, Missouri, Oregon, Pennsylvania, and Texas). The number of subgrantees participating in consortia ranged from two in New Jersey, Utah, Virginia, and Washington to more than 400 in Illinois, Michigan, Missouri, Pennsylvania, and Texas. Across the 32 states reporting suballocations for secondary consortia, the average consortia grant ranged from $15,700 in Utah to $1,582,900 in Tennessee (Exhibit 3.11).

At the postsecondary level, three states reported having one consortia (Connecticut, Massachusetts, and Nebraska), and three states reported having more than 10 (Minnesota, Oklahoma, and Pennsylvania). The number of subgrantees participating in consortia ranged from two in Connecticut and Nebraska to more than 40 in Oklahoma and Pennsylvania. Across the 10 states reporting suballocations for postsecondary consortia, the average consortia grant ranged from $56,000 in Connecticut to $374,600 in Minnesota (see Exhibit 3.12).

Grants to consortium members are pooled, and members must agree on how to use their aggregate *Perkins* funds to support CTE services across the consortium. In case study interviews, one state director stated that in the past subgrantees had largely ignored this requirement and had reallocated the funds to consortium members to be spent individually, but that consortia members in this state increasingly were meeting this requirement. Another state-level administrator reported that the state, in an effort to encourage collaboration, had imposed a requirement that LEAs could form consortia only if they joined with a regional education services unit or community college (Klein et al. 2014).

Exhibit 3.11.
Number of *Perkins* Title I secondary consortia, number of consortia members, and average consortia subgrant amount, by state, 2009–10

State	Number of consortia	Number of consortia members	Average consortia subgrant amount
Alabama	2	6	84,300
Arkansas	16	179	218,700
California	20	102	101,800
Colorado	14	108	50,900
Connecticut	6	28	63,300
Idaho	18	69	43,800
Illinois	52	483	303,800
Indiana	48	291	418,900
Iowa	49	327	51,500
Kansas	18	191	69,500
Kentucky	5	12	23,700
Massachusetts	2	11	147,000
Michigan	24	523	679,800
Minnesota	26	337	240,200
Mississippi	20	57	110,600
Missouri	60	418	187,400
Nebraska	15	233	79,700
New Hampshire	17	28	250,700
New Jersey	1	2	27,900
New Mexico	4	19	42,700
North Dakota	26	151	46,900
Oklahoma	59	311	44,700
Oregon	15	142	201,700
Pennsylvania	72	462	255,700
Rhode Island	10	38	397,200
South Dakota	21	140	38,900
Tennessee	1	25	1,582,900
Texas	52	554	85,700
Utah	1	2	15,700
Virginia	1	2	278,700
Washington	1	2	16,300
Wisconsin	30	317	134,300
Average	**22**	**174**	
Total	**706**	**5,570**	

Exhibit reads: In 2009–10, Alabama had two Title I secondary consortia with a total of six consortia members, and the average subgrant across these two consortia was $84,300.

NOTE: States not listed did not report data on secondary consortia.
SOURCE: NACTE Secondary State Director Survey Fiscal Data, 2009 (*n* = 50).

Exhibit 3.12.
Number of *Perkins* Title I postsecondary consortia, number of consortia members, and average consortia subgrant amount, by state, 2009–10

State	Number of consortia	Number of consortia members	Average consortia subgrant amount
Arkansas	2	6	148,000
Connecticut	1	2	56,000
Massachusetts	1	8	61,000
Minnesota	26	30	374,600
Missouri	8	36	296,900
Nebraska	1	2	265,800
New Jersey	3	6	64,700
Oklahoma	13	43	128,200
Oregon	8	8	267,400
Pennsylvania	15	50	239,300
Average	**8**	**19**	
Total	**78**	**191**	

Exhibit reads: In 2009–10, Arkansas had two Title I postsecondary consortia with a total of six consortia members, and the average subgrant across these two consortia was $148,000.

NOTE: States not listed did not report data on postsecondary consortia.
SOURCE: NACTE Postsecondary State Director Survey Fiscal Data, 2009 (*n* = 48).

States were most likely to waive the minimum allocation rule for LEAs serving sparsely populated areas.

Of the 22 states that granted waivers of the minimum allocation rule in 2008–09, 19 states provided waivers to LEAs located in sparsely populated areas and two states granted waivers to LEAs serving charter schools. Out of a total of 286 waivers, 94 percent (269 waivers) were granted to LEAs in sparsely populated areas (Exhibit 3.13). Most states issued a small number of such waivers; 16 of the 19 states granted waivers to 10 or fewer LEAs serving sparsely populated areas, while one predominantly rural state granted over half of these waivers (152 out of 269) (Klein et al. 2014).

Exhibit 3.13.
Number of states that used the minimum allocation waiver at the secondary level, 2008–09

Type of waiver	Number of states	Number of waivers
Sparsely populated area	19	269
Public charter school	2	12
Waiver type unknown	3	5
All waivers	22	286

Exhibit reads: In 2008–09, 19 states reported providing waivers of the minimum allocation requirement to LEAs that were located in sparsely populated areas and were unable to join a consortium. States granted such waivers to a total of 269 LEAs.

NOTES: Three states reported granting five waivers due to inability to enter into a consortium but did not indicate whether these waivers were for sparsely populated areas or charter schools. Some states provided waivers for more than one reason.
Exhibit D.10 in Appendix D shows the number of waivers reported by each state.
SOURCE: NACTE Survey of Secondary State Directors, 2009 (*n* = 50).

Uses of Funding at the Local Level

Subgrantees most frequently reported using *Perkins* funds for equipment and to provide career guidance and academic counseling to students.

At the secondary level, in 2008–09, 70 percent of local subgrantees reported using *Perkins* funds for leasing, purchasing, upgrading, or adapting equipment, and 68 percent used the funds to for providing career guidance and academic counseling. At the postsecondary level, 81 percent of subgrantees reported using *Perkins* funds for providing career guidance and academic counseling; 76 percent used the funds for leasing, purchasing, upgrading, or adapting equipment; and 69 percent used them for providing programs for special populations. More than half of subgrantees used the funds to support the implementation of POS (58 percent of secondary subgrantees and 61 percent of postsecondary subgrantees) (Exhibit 3.14).

Exhibit 3.14.
Percentage of secondary and postsecondary local subgrantees who reported using *Perkins* Title I funds for permissive uses, 2008–09

Permissive use	Secondary	Postsecondary
Leasing, purchasing, upgrading, or adapting equipment	70	76
Providing career guidance and academic counseling	68	81
Implementing POS	58	61
Promoting work-related experiences for students	56	57
Providing programs for special populations	53	69
Assisting CTE student organizations	43	23
Supporting nontraditional training and activities	39	61
Involving business and labor in designing, implementing, and evaluating CTE programs	37	45
Developing new CTE courses	36	46
Supporting teacher preparation programs	35	32
Promoting industry experiences for teachers	35	40
Improving accountability data collection and reporting	30	36
Offering mentoring and related support services	28	48
Providing training programs in automotive technologies	23	40
Providing entrepreneurship education and training	18	14
Offering continuing education or job referral services	13	27
Offering programs for adults and school dropouts	†	26
Supporting family and consumer sciences programs	†	15
Creating small, personalized career-themed learning communities	†	11

Exhibit reads: In program year 2008–09, 70 percent of secondary and 76 percent of postsecondary subgrantees reported using *Perkins* funds for leasing, purchasing, upgrading, or adapting equipment.

†Not applicable. Survey of LEA directors did not include this subitem.
SOURCE: NACTE Surveys of LEA and IHE Directors, 2009 (*n* = 1,021 LEAs, 748 IHEs).

In case study interviews, local CTE directors and faculty described ways in which local *Perkins* funds were used for equipment and training purchases. Some reported that the *Perkins* funds were used to keep their programs up-to-date and in compliance with evolving industry standards. Several directors noted that for some programs, *Perkins* funds were the only resources available for these purposes. Several local postsecondary CTE directors described combining *Perkins* funds with those of other sources, and two reported leveraging *Perkins* funds to attract funding from outside sources for large technology purchases, such as computer lab upgrades and medical equipment (Klein et al. 2014).

4

Programs of Study

One of the most substantive changes in *Perkins IV* is the requirement that all local subgrantees offer one or more POS that prepare students to make the transition from high school to college or advanced training and into a career. The introduction of POS acknowledges the economic reality that competing in a global economy demands a workforce with more advanced skills than those attained in high school and that too few individuals enter postsecondary education and persist long enough to earn an industry-recognized credential or degree that will improve their labor market prospects.

Key Findings

- Statutory provisions allow states and local subgrantees considerable flexibility in designing and implementing POS. This flexibility has led to variation — both across and within states — in how CTE practitioners define key terms, design programs, and organize, administer, and deliver services.

- Based on surveys conducted in 2009, states tended to play a larger role in developing POS at the secondary level than at the postsecondary level, where IHEs were more likely to take the lead.

    - Taking into account states that either developed POS and/or provided guidance for locally-developed POS, a total of 40 states participated in POS development at the secondary level, and 24 did so at the postsecondary level.

    - At the local level, LEA CTE directors reported that secondary CTE teachers and LEA administrators were the groups most involved in POS development, while IHE CTE directors reported that postsecondary CTE faculty and administrators were the most involved.

- Reports from both state and local CTE directors indicated incomplete compliance, as of the 2008–09 program year, with statutory requirements that POS provide a coordinated, non-duplicative progression of courses that link secondary and postsecondary education.

    - For example, at the local level, 68 percent of LEA directors and 70 percent of IHE directors reported that at least one of their five highest-enrollment POS spanned secondary and postsecondary education.

    - Smaller percentages reported that at least one of these POS was non-duplicative across the secondary and postsecondary levels (42 and 59 percent, respectively).

- Nearly two-thirds of LEA and IHE directors reported using articulation agreements with postsecondary and secondary partners to implement POS as of 2008–09, but about one-fifth said they did not know if their institutions had articulation agreements.

- IHE directors were more likely than LEA directors to report that their POS led to postsecondary credentials or degrees.

- Nearly half of all state secondary and postsecondary CTE directors (23 of each) reported in 2008–09 that CTE teachers or faculty did not have a good understanding of POS, suggesting that the POS concept was unclear to the instructors who are expected to deliver it.

- States and local subgrantees are not required to report on POS participation and outcomes, and there are no national data on the number of students participating in POS or the outcomes they achieve.

Predecessors to POS

The introduction of programs of study in *Perkins IV* reinforced and extended previous efforts to organize instruction in ways that make school more relevant to students' career goals. Over the last several decades, initiatives such as school-to-work, apprenticeships, career academies, Tech Prep, and dual enrollment were introduced to strengthen linkages between education and work, academic and technical content, and secondary and postsecondary education. Recognition of the importance of connecting secondary to postsecondary education transcends CTE, and other education approaches to connect the two levels include early college high schools, Advanced Placement courses, and International Baccalaureate programs.

Perkins' focus on secondary-postsecondary connections dates back to 1990 when Tech Prep was created as a strategy to encourage the formation of partnerships between secondary and postsecondary subgrantees through consortia that included both levels. Tech Prep programs, introduced as a special project in *Perkins II* and authorized as a separate title in *Perkins III* and *Perkins IV*, were intended to combine at least two years of secondary education with at least two years of postsecondary education with coursework offered in a non-duplicative, sequential manner that integrated academic and technical skill instruction. Where feasible, programs were expected to offer opportunities for dual enrollment and/or work-based learning experiences. Ultimately, Tech Prep programs were to lead to an associate's or bachelor's degree or a postsecondary certificate in a specific career field as well as placement in appropriate employment or further education. Tech Prep was funded from FY 1991 through FY 2010 and accounted for 8 to 10 percent of *Perkins* grants to states during those years.

Although states and local consortia were required to report the number of students participating in Tech Prep as a subpopulation within the *Perkins III* accountability system, they struggled to collect data, in part because there was no clear definition of a "Tech Prep student." Even when students could be identified, educators faced challenges tracking students across education levels (Hershey et al. 1998).

Studies of Tech Prep implementation indicated that the strategy of aligning coursework across education levels had achieved limited success in practice. Two major studies of Tech Prep found that few students completed at least two years of high school coursework that was closely linked to at least two years of related studies at the college level (Hershey et al. 1999; Silverberg et al. 2004). The *National Assessment of Vocational Education: Final Report to Congress* recommended that Congress eliminate Tech Prep as a separate title and transfer its key activities to postsecondary institutions (Silverberg et al. 2004).

Instead of eliminating Tech Prep, *Perkins IV* offered states the option to merge their Title II (Tech Prep) allocation with their Title I (basic grant) funds. Slightly more than half of states (27) opted to merge the two funding streams, but the reasons for their decisions varied. Some sought to extend the benefits of Tech Prep programs to all CTE students, while others opted to merge funds to avoid required reporting on the new set of Tech Prep measures (Klein et al. 2014). Tech Prep funding was eliminated by Congress in its April 2011 continuing resolution,[25] and the program has not been funded since that time (the *Perkins IV* authorization for Tech Prep has since expired).

[25] *Public Law* 112–010.

Components of POS

Perkins IV requires each local subgrantee to offer one or more POS that address four core elements identified in the statute. Specifically, POS:

1. Must incorporate secondary and postsecondary education elements;

2. Must include coherent and rigorous content aligned with challenging academic standards and relevant career and technical content in a coordinated, non-duplicative progression of courses that align secondary education with postsecondary education to adequately prepare students for success in postsecondary education;

3. May offer the opportunity for high school students to participate in dual or concurrent enrollment programs or other ways to acquire postsecondary education credits; and

4. Must lead to an industry-recognized credential or certificate at the postsecondary level or an associate's or bachelor's degree.

In the early years of *Perkins IV* implementation, the statutory definition was the only information available to guide state and local practitioners in POS development. In January 2010, the U.S. Department of Education released a *POS Design Framework*, which was based in part on input provided by a diverse group of CTE practitioners and researchers. The *Framework* identified 10 components of effective POS (Exhibit 4.1), which may be adopted by states and local subgrantees. The *Framework* was intended to be a voluntary guide to assist state and local CTE directors in the design, development, and implementation of POS that fulfill statutory requirements.

POS Design and Development

Flexibility in the statutory language permitted state and local experimentation as well as a wide range of interpretations of POS components. As a result, there is significant variation in the content and components of POS both across and within states, as well as variation in the processes and stakeholders involved in designing and implementing POS.

Some states employed a centralized approach by developing model POS across all CTE program areas and requiring local agencies to adopt state definitions and course sequencing or apply for waivers to establish their own programs. Other states left POS development largely to local discretion, although they sometimes provided guidance or required compliance with some minimum criteria.

Exhibit 4.1.
POS Design Framework

Legislation and Policies	Federal, state, and local legislation or administrative policies that promote POS development and implementation.
Partnerships	Ongoing relationships among education, business, and other community stakeholders that are central to POS design, implementation, and maintenance.
Professional Development	Sustained, intensive, and focused opportunities for administrators, teachers, and faculty involved in the design, implementation, and maintenance of POS.
Accountability and Evaluation	Systems and strategies to gather quantitative and qualitative data on both POS components and student outcomes to aid ongoing efforts to develop and implement POS.
College and Career Readiness Standards	Content standards that define what students are expected to know and be able to do to enter and advance in college and/or careers.
Course Sequences	Non-duplicative sequences of secondary and postsecondary courses within POS that ensure that students can make a transition to postsecondary education without duplicating classes or requiring remedial coursework.
Credit Transfer Agreements	Credit transfer agreements that provide opportunities for secondary students to gain postsecondary credits, supported by formal agreements between secondary and postsecondary partners.
Guidance Counseling and Advisement	Guidance counseling and advisement that help students make informed decisions about which POS to pursue.
Teaching and Learning Strategies	Innovative and creative instructional approaches that enable teachers to integrate academic and technical instruction and students to apply academic and technical learning in their POS coursework.
Technical Skill Assessments	National, state, and/or local assessments that provide ongoing information on student attainment of the necessary knowledge and skills for entry and advancement in postsecondary education and careers in their chosen POS.

SOURCE: U.S. Department of Education, Office of Vocational and Adult Education (2010), *Career and Technical Programs of Study: A Design Framework*, Washington, DC.

States tended to play a larger role in developing POS at the secondary level than at the postsecondary level, where IHEs were more likely to take the lead.

In 2009, 29 out of 41 responding state secondary directors reported developing POS at the state level, and 28 reported that POS were developed locally. In contrast, 11 out of 29 responding state postsecondary directors reported having state-developed POS and 21 reported that POS were developed locally (Exhibit 4.2).

Some state directors reported that there were both state- and locally-developed POS in their state, particularly at the secondary level. For example, some released state-developed models or templates but also allowed local subgrantees to develop their own programs. At the secondary level, 16 states reported having both state- and locally-developed POS, while three states reported both state- and locally-developed POS at the postsecondary level. Taking into account states that either developed POS and/or provided guidance for locally-developed POS, a total of 40 states participated in POS development at the secondary level and 24 did so at the postsecondary level.

Exhibit 4.2.
Number of states reporting various strategies to develop POS, and average number of POS reported by local directors in states using each strategy, by education level, 2008–09

	Number of states reporting approach to developing POS		Average number of POS reported by local CTE directors	
Type of POS development approach	Secondary (*n* = 41)	Postsecondary (*n* = 29)	LEA directors (*n* = 687)	IHE directors (*n* = 549)
State-developed	29	11	10	18
Locally-developed	28	21	9	18
Locally-developed with state guidance	27	16	8	16
Locally-developed without state guidance	5	5	7	17
Overall average	†	†	11	22

Exhibit reads: In 2008–09, 29 out of 41 responding state secondary directors reported that POS had been developed at the state level. Local LEA directors reported an average of 10 state-developed POS were available in their district.

†Not applicable.
NOTES: Some states used more than one approach (for example, four states reported that locally-developed POS included POS developed with state guidance as well as POS developed without state guidance). The unduplicated count of states that reported either that POS were developed by the state and/or were locally-developed with state guidance was 40 at the secondary level and 24 at the postsecondary level.
SOURCE: NACTE Surveys of Secondary and Postsecondary State Directors and Surveys of LEA and IHE Directors, 2009.

State approval processes were sometimes used as quality control mechanisms, with 29 secondary and 20 postsecondary state directors reporting that state approval was required for all POS offered by local subgrantees. At the other end of the spectrum, 10 secondary and 18 postsecondary state directors reported that state approval was not required for any POS, meaning that the POS design characteristics and components were left completely in the hands of local administrators (Klein et al. 2014).

LEA CTE directors reported that secondary CTE teachers and LEA administrators were the groups most involved in POS development, while IHE CTE directors reported that postsecondary CTE faculty and administrators were the most involved.

Local CTE directors' perceptions of who was most involved in POS development varied based on whether they directed LEA or IHE CTE programs. For example, 66 percent of LEA directors reported that secondary CTE teachers participated "a lot" in developing POS, but only 16 percent reported the same level of participation among postsecondary CTE faculty. Conversely, 59 percent of IHE directors reported that postsecondary CTE faculty participated a lot in developing POS compared with 37 percent reporting this for secondary CTE teachers (Exhibit 4.3). Similar patterns were found for administrators and academic teachers.

LEA directors reported that CTE teachers were more likely than academic teachers to participate a lot in developing POS (66 percent vs. 14 percent). Reports of IHE directors showed a similar pattern (59 vs. 27 percent).

In terms of industry involvement in POS development, IHE directors were more likely than LEA directors to report substantial involvement of business and union groups. For example, 27 percent of IHE directors reported a lot of participation of local business and unions and 13 percent reported this for national industry and union groups, compared with 13 percent and 6 percent, respectively, of LEA directors.

Exhibit 4.3.
Percentage of LEA and IHE directors reporting that various stakeholders participated "a lot" in POS development, 2008–09

Stakeholder group	As reported by LEA CTE directors	As reported by IHE CTE directors
Secondary CTE teachers	66	37
Postsecondary CTE faculty	16	59
LEA administrators	37	20
Postsecondary administrators	9	52
Secondary academic teachers	14	12
Postsecondary academic faculty	8	27
Local business, unions	13	27
National industry, union groups	6	13
Local chamber of commerce	5	6

Exhibit reads: Among LEA CTE directors, 66 percent reported that secondary CTE teachers participated "a lot" in POS development, compared with 16 percent reporting that postsecondary CTE faculty participated "a lot."

SOURCE: NACTE Surveys of LEA and IHE Directors, 2009 (*n* = 1,001 LEAs, 736 IHEs).

Roughly half of CTE directors (46 percent secondary and 56 percent postsecondary) reported that one or more of their POS were previously part of a Tech Prep program (Klein et al. 2014).

POS Implementation Challenges

Although state and local CTE practitioners reported making progress in implementing POS, they also reported challenges relating to bridging the institutional divide between secondary and postsecondary CTE programs, as well as challenges to bridging the instructional divide between academic and technical faculty.

Secondary and postsecondary CTE programs are organized and delivered independently at both the state and local levels, and collaboration across this institutional divide requires time, effort, and commitment outside the day-to-day routine at either level. Study findings suggest that this collaboration did not occur consistently. Specific challenges arose with implementing requirements to align course sequences across the secondary and postsecondary levels, offer dual or concurrent enrollment, and ensure that POS lead to a postsecondary degree or certificate. Where effective secondary-postsecondary partnerships were reported, their success depended largely on local relationships between individuals at the two levels of institutions.

Reports from both state and local CTE directors indicated incomplete compliance, as of the 2008–09 program year, with statutory requirements that POS provide a coordinated, non-duplicative progression of courses that link secondary and postsecondary education.

For example, at the local level, 68 percent of LEA directors and 70 percent of IHE directors reported that at least one of their five highest-enrollment POS spanned secondary and postsecondary education. Both groups were less likely to report that POS course sequences were non-duplicative across secondary and postsecondary levels (42 percent of LEA directors and 59 percent of IHE directors) than to offer opportunities for dual or concurrent enrollment (58 and 76 percent, respectively) (Exhibit 4.4).

Exhibit 4.4.
Percentage of LEA and IHE directors reporting that at least one of their five highest-enrollment POS had certain linkages between secondary and postsecondary education, 2008–09

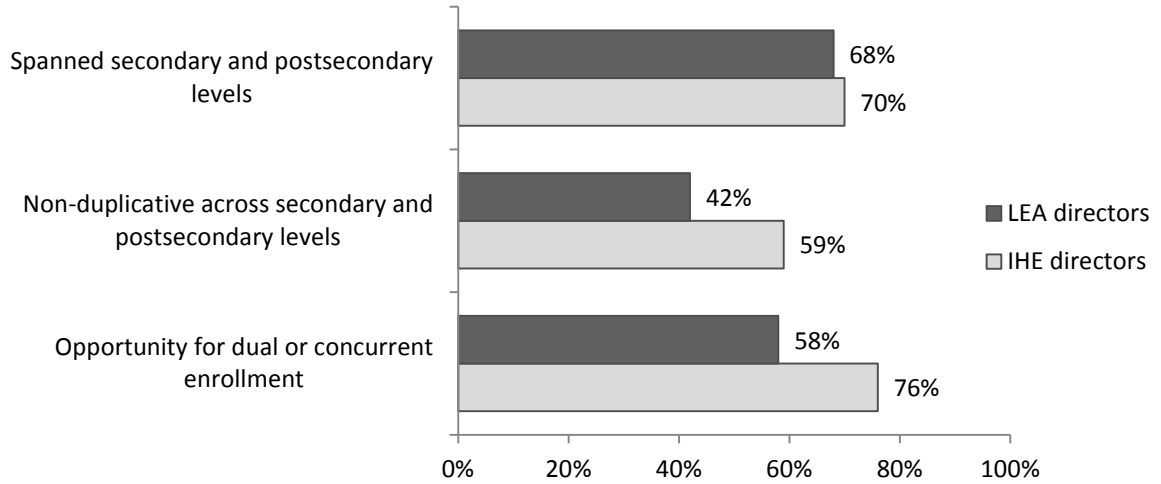

Exhibit reads: Sixty-eight percent of LEA directors reported that at least one of their five highest-enrollment POS spanned the secondary and postsecondary levels.

SOURCE: NACTE Surveys of LEA and IHE Directors, 2009 (*n* = 981 LEAs, 714 IHEs).

A sizeable proportion of local directors (24 percent of LEA directors and 15 percent of IHE directors) did not know if their POS included both secondary and postsecondary elements. Similarly, 42 percent of LEA directors and 35 percent of IHE directors did not know if their POS included non-duplicative course sequences.

A challenge for implementing the dual enrollment component is how to pay for it. Three of the six case study states provided funds for dual enrollment, but the other three states did not. The states that provided funding for dual enrollment used different procedures, including (1) having the LEA or IHE reimburse the other, depending on whose instructor taught the course, (2) area CTE centers handling the funds for dual enrollments, or (3) including dual enrollment students in the LEA's daily attendance funds and reimbursing the IHE from other sources. In the states that did not provide funds for dual enrollment, one obstacle cited was concern about paying for the same student twice through both secondary and postsecondary state funding formulas (Klein et al. 2014).

As of 2008–09, nearly two-thirds of LEA and IHE directors reported using articulation agreements with postsecondary and secondary partners to implement POS, but about one-fifth said they did not know if their institutions had articulation agreements.

Sixty-two percent of LEA directors reported having articulation agreement with one or more postsecondary institutions for at least one of their five highest-enrollment POS, and 36 percent reported having such agreements with two or more postsecondary institutions. Similarly, 63 percent of IHE directors reported having such articulation agreements with LEAs, and 58 percent reported having agreements with two or more LEAs). However, 22–25 percent of LEA directors and 18–19 percent of IHE directors did not know whether their organization had such articulation agreements (Exhibit 4.5).

Exhibit 4.5.
Percentage of LEA and IHE directors reporting that at least one of their five highest-enrollment POS was part of an articulation agreement, 2008–09

POS component	Agreement with one or more IHEs or LEAs	Agreement with two or more IHEs or LEAs
Percent of LEA directors reporting that at least one of their five highest-enrollment POS was part of an articulation agreement with a postsecondary institution	62%	36%
Percent of IHE directors reporting that at least one of their five highest-enrollment POS was part of an articulation agreement with a school district	63%	58%

Exhibit reads: Sixty-two percent of LEA directors reported that at least one of their five highest-enrollment POS was part of an articulation agreement with one or more postsecondary institutions.

NOTES: Between 22–25 percent of LEA directors and 18–19 percent of IHE directors did not know whether their organization had such articulation agreements. Some LEA and IHE respondents indicated that at least one of their highest-enrollment POS was covered by a statewide articulation agreement; if those responses are also included, then the percentage of local directors reporting use of articulation agreements was 65 percent for LEA directors and 69 percent for IHE directors.
SOURCE: NACTE Surveys of LEA and IHE Directors, 2009 (*n* = 980 LEAs, 710 IHEs).

One state CTE administrator said that the state is using POS to send a message to local school districts and colleges: "You will align your curriculum, and you will create the sequence of courses. And we don't want students shot-gunning all over the place and then showing up at the postsecondary doorstep taking a bunch of remedial courses." A local CTE coordinator in a small district in another state, in describing a shift in thinking after *Perkins IV:* "I don't want to articulate [individual] courses anymore. We articulate programs [e.g., POS]." (Klein et al. 2014)

IHE directors were more likely than LEA directors to report that their POS led to postsecondary credentials or degrees.

Because IHEs are directly involved in awarding postsecondary certificates and degrees, it is not surprising that IHE directors were more likely than LEA directors to report that at least one of their top five POS led to a postsecondary certificate (80 vs. 43 percent) or associate's degree (77 vs. 33 percent). LEA directors were more likely to report that their POS led to an industry-recognized or sponsored credential (47 percent) than that they led to an associate's degree (33 percent) (Exhibit 4.6).

Exhibit 4.6.
Percentage of LEA and IHE directors reporting that at least one of their five highest-enrollment POS led to certain credentials, 2008–09

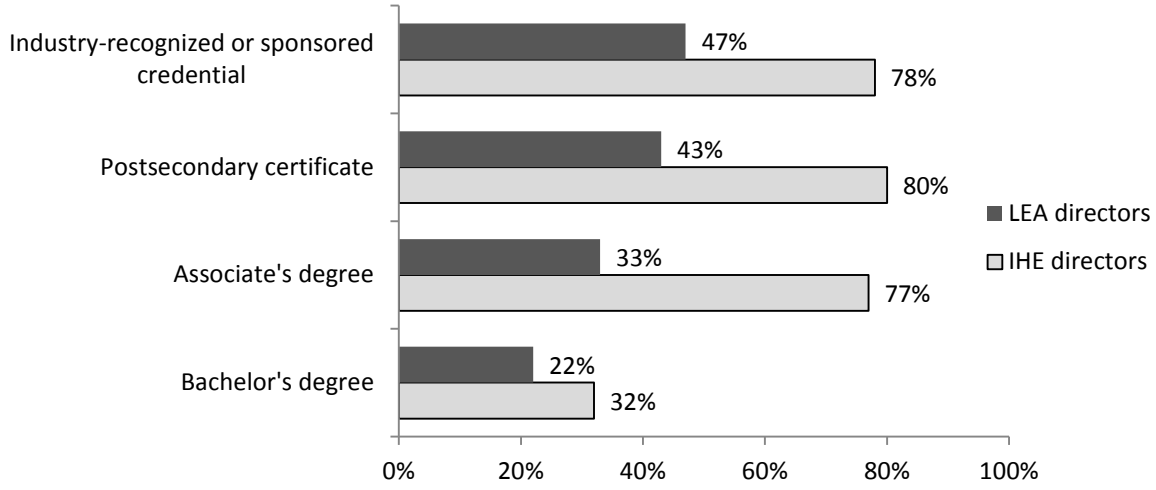

Exhibit reads: Forty-seven percent of LEA directors reported that one or more of their five highest-enrollment POS led to an industry-recognized or sponsored credential.

SOURCE: NACTE Surveys of LEA and IHE Directors, 2009 (*n* = 974 LEAs, 712 IHEs).

Nearly half of all state secondary and postsecondary CTE directors (23 of each) reported in 2008–09 that CTE teachers or faculty did not have a good understanding of POS, suggesting that the POS concept was unclear to the instructors who are expected to deliver it.

While nearly half of state CTE directors reported lack of understanding of POS among CTE teachers or faculty, an even greater number (40 secondary, 28 postsecondary) reported that academic teachers or faculty do not have a good understanding of POS (Exhibit 4.7). This was also a frequently-mentioned challenge in the case study interviews at both the secondary and postsecondary levels. One community college administrator commented, "I don't even think the academic teachers understand where they fit into [POS]." (Klein et al. 2014)

Exhibit 4.7.
Number of states reporting various barriers to POS development, 2009

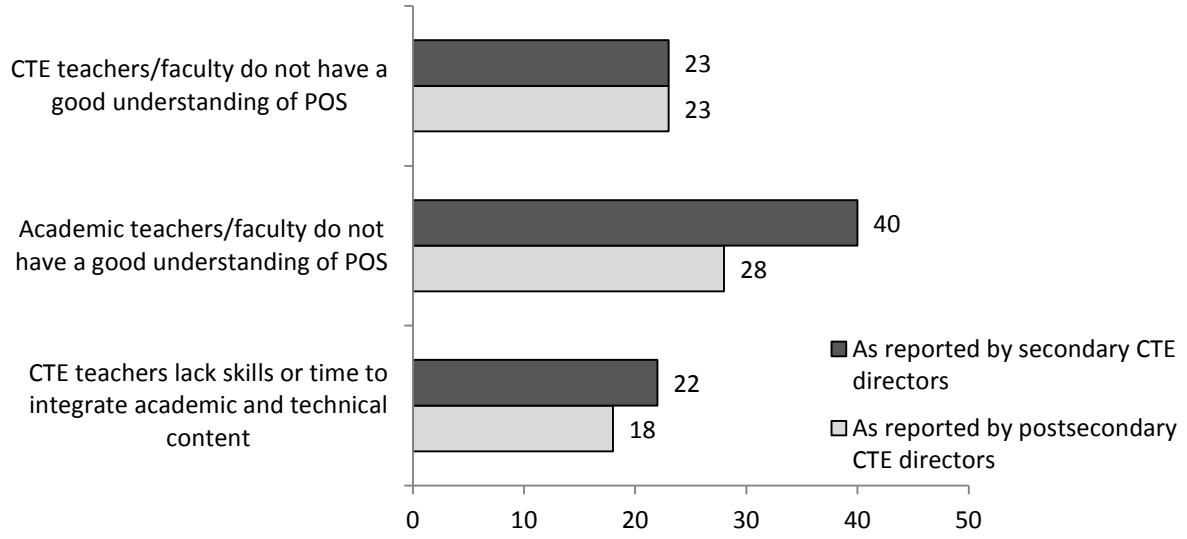

Exhibit reads: Twenty-three state secondary CTE directors reported that CTE teachers or faculty do not have a good understanding of POS.

SOURCE: NACTE Surveys of Secondary and Postsecondary State Directors, 2009 (*n* = 51 secondary, 48 postsecondary).

Measurement

States and local subgrantees are not required to report on POS participation and outcomes, and there are no national data on the number of students participating in POS or the outcomes they achieve.

Perkins IV does not require states to measure or report information specific to POS implementation. The statute neither offers a specific definition of a POS student, nor does it hold states and local subgrantees accountable for reporting on student participation and outcomes. In the absence of federal accountability requirements, few states or local subgrantees could provide data on student involvement in POS. As of fall 2009, 13 secondary state directors and 21 postsecondary state directors could not estimate the percentage of students in their states who were enrolled in POS. Estimates of student participation in POS offered by the remaining state directors ranged from none to all CTE students in the state (Klein et al. 2014).

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5 Accountability

Perkins IV requires states and local CTE providers to collect and report data about the performance of their *Perkins* programs. States must establish performance targets for a required set of core indicators, in consultation with the U.S. Department of Education, and must submit annual data on their progress toward meeting these targets. The statute also requires states to negotiate performance targets with local subgrantees. States and local providers failing to achieve their agreed-upon targets face sanctions that begin with developing a program improvement plan and could culminate in the loss of some or all of their *Perkins* funding.

Key Findings

- For each performance indicator, three-fourths or more of the states met at least 90 percent of their performance target in 2011–12, at both the secondary and postsecondary levels.
- Flexibility in the *Perkins* accountability system precludes the ability to use the performance indicator data for valid comparisons between states or for aggregating data across states to examine national progress over time.
- Local subgrantees used a variety of methods to identify CTE concentrators, including local management information systems, statewide databases, teacher identification of concentrators based on coursetaking, and student self-reports.
- *ESEA* assessments are often administered before CTE students reach concentrator status, so the academic attainment indicator often provides information on the academic abilities of students who subsequently become CTE concentrators.
- Some states reported mathematics and English/language arts proficiency rates for CTE concentrators under *Perkins* that were unexpectedly higher than the proficiency rates they reported for all students under *ESEA* and that appear to be inconsistent with research findings. Similar patterns were found for reporting on graduation rates.
- Most states used national or state assessments for reporting on the *Perkins* indicator for technical skill attainment. At the local level, subgrantees often used different measures to assess technical skill attainment than were used for performance indicator reporting.
- Most states used administrative records to report on the placement of students who exited the program. At the secondary level, states most commonly used the state higher education database to acquire placement information about their students, while at the postsecondary level, the most commonly used data source was state unemployment insurance wage records.
- Most states reporting using *Perkins* performance indicator data to identify programs needing improvement and to provide targeted technical assistance.

The *Perkins* Accountability Framework

The *Perkins* accountability framework has evolved over several decades, with each reauthorization expanding the requirements to address national policy priorities (Exhibit 5.1). In 1990, *Perkins II* laid the foundation for the current accountability system by requiring states to develop a system of performance measures. *Perkins II* allowed states broad flexibility in constructing measures and did not require them to share performance results with the Department. *Perkins III* required states to report on certain specific indicators (referred to as "core indicators") that were listed in the statute.

Perkins IV revised the accountability requirements to introduce separate core indicators for secondary and postsecondary education, add two secondary core indicators aligned with *ESEA* requirements (proficiency on state assessments and graduation rates), and require reporting of disaggregated data to include the same subgroups as are used for *ESEA* reporting, in addition to the "special populations" that are specifically listed in the *Perkins* statute. *Perkins IV* also extended accountability and reporting requirements to apply to local subgrantees. Finally, new references in *Perkins IV* to valid and reliable data set a higher expectation for performance reporting.

States negotiate with the Department to establish agreed-upon targets for each indicator and may update the targets periodically.[26] States must report annual performance indicator data to the Department by December 31, six months after the end of each program year.

For the first time, *Perkins IV* extends the same level of accountability to local subgrantees, which now must adopt their state's levels of performance or negotiate separate performance targets with the state. Both states and local subgrantees that do not achieve at least 90 percent of their agreed-upon performance targets must develop improvement plans. If states or local subgrantees do not implement an improvement plan, show improvement within a year of plan implementation, or meet at least 90 percent of the negotiated target on a single indicator for three consecutive years, they may face fiscal sanctions.

States must report outcomes for all CTE students, overall and by race, ethnicity, and gender and for certain student subgroups: students with disabilities; students from economically disadvantaged families, including foster children; students preparing for nontraditional fields; single parents, including single pregnant women; displaced homemakers; students with limited English proficiency; and, at the secondary level, migrant students.

Perkins IV specifies six secondary and five postsecondary core indicators for which states must report valid and reliable data, and the Department's nonregulatory guidance operationalized these indicators into eight secondary and six postsecondary performance indicators[27] (see Exhibits D.11 and D.12 in Appendix D). Concentrators are the cohort of students evaluated in all of the core indicators except nontraditional participation, which focuses on the outcomes of participants at the secondary and postsecondary levels.

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[26] States set targets as part of their five-year plans, with an option to negotiate new targets prior to the third and fifth program years. The Department allows states to request performance-level revisions in other years "if the State can show that an unanticipated circumstance arose in the State that resulted in a significant change in the factors that were considered" when the state originally negotiated targets (Dann-Messier 2009, p. 2).

[27] The nonregulatory guidance divided the secondary academic attainment indicator into two indicators, one for reading and one for math, and divided the nontraditional participation and completion indicator into separate indicators for nontraditional participation and nontraditional completion.

Exhibit 5.1.
Growth of accountability requirements in *Perkins II*, *III*, and *IV*

Requirement	*Perkins II*	*Perkins III*	*Perkins IV*
Performance indicators	• Required states to establish measures of learning and competency gains and at least one of four specified measures of performance. • Allowed states to consider standards and measures of the *Social Security Act* and *Job Training Partnership Act* when developing measures.	• Introduced four core indicators for secondary and postsecondary. • Allowed states to substitute other existing state performance measures if they were aligned with the statute. • Gave states the option to include additional performance indicators.	• Introduces six separate core indicators for secondary and five indicators for postsecondary. • Aligns three secondary indicators with the ESEA performance measures. • Continues option to substitute existing state indicators if they are aligned with the statute. • Establishes separate indicators for Tech Prep for states that do not merge Tech Prep and basic grant funding.
Indicator definitions	• Permitted states to develop their own data collection and reporting methodologies.	• Permitted states to develop their own data collection and reporting methodologies. • Required that technical skill proficiencies be aligned with state-established vocational and technical skill standards.	• Permits states to develop their own data collection and reporting methodologies. • Adds requirement that technical skill proficiencies be aligned with industry-recognized standards, if available and appropriate. • Adds references to validity and reliability of reported performance results.
Reporting	• Did not require states to report performance to the Department.	• Required states to report progress of all CTE students, including special populations. • Added single parents and displaced homemakers to the definition of special populations.	• Requires states to report progress of all CTE students, including disaggregated data for special populations, which are defined to include migrant students at the secondary level and to eliminate individuals with other barriers to educational attainment from the definition. • Adds requirement to report the disaggregated data for the same subgroups as required in the *ESEA*.
Performance targets and sanctions	• None.	• Required states to set performance targets and implement state improvement plans if targets were not met. • Introduced sanctions for states that did not implement improvement plans or showed no improvement within one year of plan implementation or for two or more consecutive years.	• Requires states to set performance targets and implement state improvement plans if 90 percent of targets are not met. • Adds requirement that subgrantees negotiate performance targets and implement local improvement plans if targets are not met. • Extends use of sanctions to subgrantees that do not implement improvement plans or show no improvement within one year of plan implementation or for three or more consecutive years.

State-Reported Results for Performance Indicators

States are to submit performance data to the Department for all *Perkins* indicators by December 31 of each year. Once the performance data have been certified by the state, the Department reviews the data and begins a process of validation. States that do not meet at least 90 percent of their target on any individual measure must develop an improvement plan.

For each performance indicator, three-fourths or more of the states met at least 90 percent of their performance target in 2011–12, at both the secondary and postsecondary levels.

At the secondary level, at least 28 states (55 percent) met or exceeded targets for each performance indicator in 2011–12, and at least 39 states (76 percent) met at least 90 percent of their target for an indicator. At the postsecondary level, at least 20 states met or exceeded targets for each performance indicator, and at least 38 states met at least 90 percent of their target for an indicator. Across all eight secondary indicators, between 28–45 states met or exceeded their performance targets, depending on the indicator; between 39–49 states met at least 90 percent of their targets for seven out of eight indicators, and all 50 states and the District of Columbia met at least 90 percent of their graduation rate target. Across all six postsecondary indicators, 20–35 states met or exceeded their targets, and 38–50 states met at least 90 percent of their targets (Exhibit 5.2).

Exhibit 5.2.
Number of states that met or exceeded their negotiated performance targets for *Perkins* core indicators, and number that met at least 90 percent of their targets, by education level, in 2011–12

	Secondary		Postsecondary	
Core indicators	Met or exceeded target	Met at least 90% of target	Met or exceeded target	Met at least 90% of target
Academic attainment — reading/language arts	31	44	†	†
Academic attainment — mathematics	28	41	†	†
Technical skill attainment	35	47	34	50
Completion	40	49	21	38
Graduation rate	45	51	†	†
Retention or transfer	†	†	25	46
Placement	31	46	20	43
Nontraditional participation	32	44	35	45
Nontraditional completion	31	39	32	41

Exhibit reads: Thirty-one states met or exceeded their negotiated *Perkins* performance target for academic attainment in reading/language arts. Forty-four states met at least 90 percent of the negotiated performance target for the indicator, the threshold by which a state would be required to submit a performance improvement plan if it did not meet it.

†Indicator is not applicable at this level.
NOTE: Data are missing from three states: Mississippi (secondary "nontraditional completion"); Washington (postsecondary "technical skill attainment" and postsecondary "completion"); and Wisconsin (secondary "placement").
SOURCE: *Perkins* Consolidated Annual Reports (n = 51).

Measurement Issues

Perkins IV emphasizes the importance of data quality, including multiple references to "valid and reliable" data, although the statute does not define these terms. In general, **validity** refers to whether populations and indicators measure what they are intended to measure, while **reliability** refers to the stability of results. In addition, this report also uses the term **comparability** to refer to whether measures and methods are consistent across states. This section provides information about issues that may affect the validity, reliability, and comparability of state-reported accountability data.

Flexibility in the *Perkins* accountability system precludes the ability to use the performance indicator data for valid comparisons between states or for aggregating data across states to examine national progress over time.

Under *Perkins IV*, states have the flexibility to choose their own measures and definitions for reporting on performance indicators, which means that the indicator data are not comparable across states. For example, for the technical skill attainment indicator, state measures have included state assessments, course completion, industry-recognized credentials or certificates, and grade point averages, among others. In addition, states may permit local subgrantees to use different definitions and measurement approaches.

The nonregulatory guidance sought to encourage more comparability of measures across states by providing suggested definitions for *Perkins IV* performance measures and student populations. Nearly all state CTE directors reported either using the suggested definitions in the guidance verbatim or consulting the guidance as they developed their own definitions. For most indicators, fewer than half reported using the guidance definition verbatim (Exhibit 5.3).

Exhibit 5.3.
Number of states that reported using or consulting the nonregulatory guidance for developing definitions for *Perkins IV* performance measures and populations, 2009

Measures and populations	Secondary			Postsecondary		
	Used verbatim	Consulted	Did not use	Used verbatim	Consulted	Did not use
Measures						
Academic attainment	24	27	0	†	†	†
Technical skill attainment	17	32	1	14	29	5
Completion	20	30	1	19	28	1
Graduation rate	23	27	1	†	†	†
Retention or transfer	†	†	†	21	26	1
Placement	20	30	1	22	26	0
Nontraditional participation	22	27	2	28	19	1
Nontraditional completion	20	29	2	26	21	1
Populations						
CTE participants	18	30	3	21	25	2
CTE concentrators	14	35	2	13	33	2

Exhibit reads: At the secondary level, 24 state CTE directors reported that their state used nonregulatory guidance language verbatim for the academic attainment indicator, and 27 reported that they consulted the guidance.

†Indicator is not applicable at this level.
NOTE: Among states that "consulted" the guidance, some developed definitions that were similar to those contained in the guidance, but the NACTE did not conduct a systematic analysis of the extent to which state definitions were similar to or different from the guidance definitions.
SOURCE: NACTE Surveys of Secondary and Postsecondary State Directors, 2009 (*n* = 51 secondary, 48 postsecondary).

Even when states use the same definitions, specific measures or measurement approaches may differ. For example, state academic assessments are not comparable across states, reflecting different content and performance standards as well as differences in test timing and administration. Measures of course and program completion have similar issues, since specific course and program requirements likely vary across jurisdictions. Student grade point averages also may reflect varying standards and expectations, not only across sites but also across individual teachers. Another area of variation is the definition of CTE concentrators, which is the cohort of students evaluated in most indicators. Again, fewer than half of state CTE directors reported using the guidance definition verbatim, although most of the remaining state directors reported that they consulted the guidance in some way (Exhibit 5.3).

Local subgrantees used a variety of methods to identify CTE concentrators, including local management information systems, statewide databases, teacher identification of concentrators based on coursetaking, and student self-reports.

In 2009, local CTE directors were more likely to report that identification of CTE concentrators was done using a local management information system (60 percent of IHE directors and 57 percent of LEA directors) than using a statewide database (34 percent and 26 percent, respectively). A common method among LEAs was for teachers to identify CTE concentrators based on coursetaking (50 percent), but this method was less common at the postsecondary level (25 percent). Some subgrantees allowed CTE students to self-report their concentrator status (reported by 20 percent of IHE directors and 12 percent of LEA directors) (Exhibit 5.4).

Exhibit 5.4.
Percentage of LEAs and IHEs reporting various methods for identifying CTE concentrators, 2009

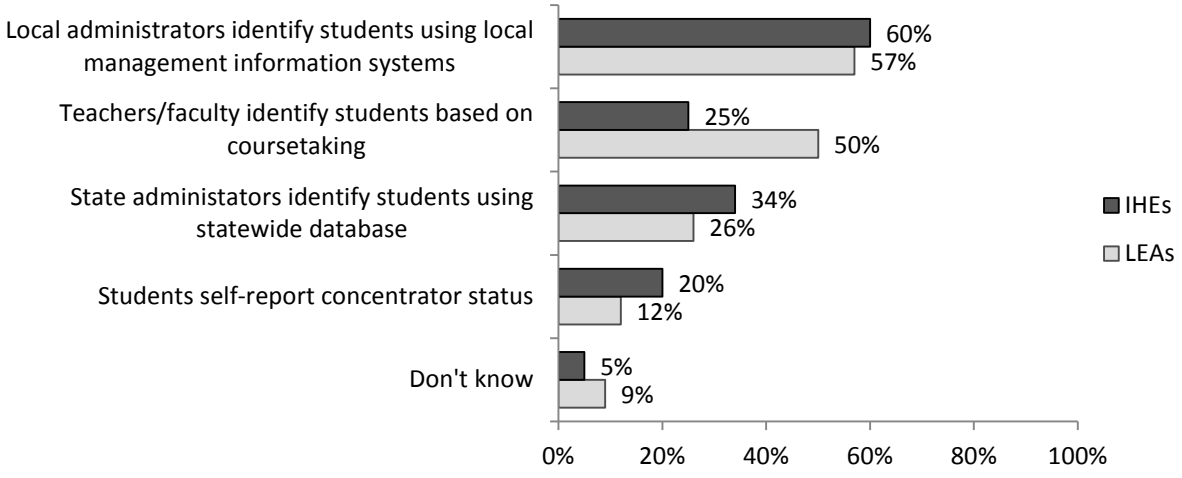

Exhibit reads: Sixty percent of IHEs and 57 percent of LEAs reported that local administrators used local management information systems to identify students who were CTE concentrators.

NOTE: Survey respondents could report using more than one method.
SOURCE: NACTE Surveys of LEA and IHE Directors of CTE, 2009 (*n* = 1,014 LEAs, 736 IHEs).

To inform *Perkins* reauthorization efforts, the Department formed the State *Perkins* Accountability Congress (SPAC) in 2011 to facilitate dialogue among federal and state staff about ways to improve performance measurement and promote meaningful comparisons across and within states. The SPAC final report, issued in February 2013, provided recommendations for improving the validity,

reliability, and comparability of performance measures, including revised CTE participation thresholds for students to be included in performance reporting (Richards et al. 2013).[28]

Secondary Academic Attainment

Perkins IV directs states to assess the academic attainment of students identified as CTE concentrators using the same academic assessments that they use to meet *ESEA* requirements.

ESEA assessments are often administered before CTE students reach concentrator status, so the academic attainment indicator often provides information on the academic abilities of students who subsequently become CTE concentrators.

In many cases, secondary CTE students may not be identified as CTE concentrators until they complete the 11th or 12th grade; although state definitions of CTE concentrator vary, they often require that a student has earned three or more credits in a single CTE program area (see Exhibit 1.5). States most commonly administer their *ESEA* high school assessments in the 10th or 11th grade, which may occur before a CTE student has earned the number of credits required to be considered a CTE concentrator.[29] For students who attain CTE concentrator status one or two years after taking their last *ESEA* high school assessments, the academic attainment indicator may be providing information on their academic achievement before they took or completed all of their CTE coursework rather than on the impact of CTE on academic attainment.

Some states reported mathematics and English/language arts proficiency rates for CTE concentrators under _Perkins_ that were unexpectedly higher than the proficiency rates they reported for all students under _ESEA_ and that appear to be inconsistent with research findings.

Based on state mathematics assessments, 28 states and the District of Columbia reported a higher proficiency rate for CTE concentrators compared with the proficiency rate reported for all students under *ESEA* reporting, and 16 reported proficiency rates for CTE students that were 10 or more percentage points higher than those reported for all students. At the same time, a sizeable number of states (21) reported lower mathematics proficiency rates for CTE concentrators than for all students. One state (Illinois) reported the same mathematics proficiency rate for CTE students and all students (Exhibit 5.5). Similar results were found for *Perkins* reporting on CTE concentrators' performance on English/language arts assessments (see Exhibit D.13 in Appendix D).

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[28] The SPAC report also proposed changes to core indicators, including the addition of indicators on employment rates and earnings and elimination of indicators on nontraditional enrollment and completion and secondary academic attainment. The report provided suggestions for improving measurement approaches and data collection methods for each indicator. More detailed information about the SPAC initiative and results can be obtained from the SPAC website (http://cte.ed.gov/spac/) or from the *State* Perkins *Accountability Congress Final Report*, available at http://cte.ed.gov/spac/downloads/SPAC_Final_Report_February_2013.pdf.

[29] Based on a Council of Chief State School Officers report that summarized state *ESEA* high school assessments for the 2009–10 school year, the highest grade in which such mathematics assessments were administered was the 10th grade in 11 states, the 11th grade in 26 states, and the 12th grade in 11 states (information was not available for three states). Similar patterns were found for English/language arts assessments (Blank and Stillman, 2010).

Exhibit 5.5.
Proficiency rates on state high school mathematics assessments for CTE concentrators as reported under *Perkins* and for all students as reported under *ESEA*, by state, 2011–12

State	*Perkins* reporting	*ESEA* reporting	Difference
Florida	88	47	41
Colorado	72	36	36
Arizona	89	60	29
Wisconsin	73	44	29
Georgia	89	61	28
Virginia	99	73	26
Texas	96	74	22
Tennessee	73	55	18
Idaho	93	78	15
Minnesota	56	42	14
District of Columbia	57	43	14
Oklahoma	77	64	13
Oregon	79	66	13
Ohio	94	83	11
Connecticut	88	77	11
New Mexico	49	39	10
Nevada	82	73	9
Mississippi	80	72	8
Rhode Island	38	30	8
Alaska	68	62	6
North Dakota	64	58	6
Kentucky	45	40	5
Maryland	88	84	4
Alabama	89	85	4
Kansas	87	83	4
New Jersey	82	79	3
New York	95	92	3
Wyoming	69	66	3
Nebraska	57	56	1
Illinois	52	52	0
South Dakota	68	69	–1
California	55	58	–3
Iowa	77	81	–4
Montana	56	60	–4
Hawaii	41	46	–5
Arkansas	72	78	–6
Michigan	23	30	–7
Massachusetts	70	78	–8
Louisiana	74	83	–9
Delaware	62	71	–9
Indiana	67	78	–11
New Hampshire	25	36	–11
Missouri	44	57	–13
West Virginia	34	48	–14
North Carolina	69	83	–14
Maine	29	47	–18
Pennsylvania	39	58	–19
Vermont	16	36	–20
Utah	43	63	–20
South Carolina	56	82	–26
Washington	46	75	–29

SOURCES: *Perkins* Consolidated Annual Reports (*n* = 51); *ESEA* Consolidated State Performance Reports (*n* = 51).

The pattern of higher proficiency rates reported for CTE concentrators than for all students that was found in many states is inconsistent with research findings that indicate that CTE concentrators often face additional challenges and have lower academic attainment than other students.[30] A variety of factors could contribute to this finding. The *Perkins* indicator's focus on CTE concentrators who left secondary education in the *Perkins* reporting year would tend to exclude low-achieving students who dropped out of school prior to the 12th grade but after taking the high school academic assessments. States that maintain separate data systems for CTE may face technical challenges in replicating the *ESEA* computation for CTE concentrators (Klein et al. 2014; U.S. Government Accountability Office 2009). CTE concentrators are defined differently for the purposes of indicator reporting and analyses of NCES data, as discussed in Chapter 1. Finally, national patterns found using NCES data may differ from patterns that exist in individual states. More research is needed to examine possible explanations for the different patterns found between state-reported *Perkins* and *ESEA* indicator data.

Technical Skill Attainment

The Department's nonregulatory guidance asks states to report the number of concentrators who pass technical skill assessments aligned with industry-recognized standards, if available and appropriate.

Most states used national or state assessments for reporting on the *Perkins* indicator for technical skill attainment. At the local level, subgrantees often used different measures to assess technical skill attainment than were used for performance indicator reporting.

Forty-three secondary directors and 33 postsecondary directors reported using national or state assessments as an indicator of technical skill attainment. The second most common measure at the postsecondary level was grade point average (17 states), but this measure was less common at the secondary level (four states). Course or program completion was used by 10 states at the secondary level and nine states at the postsecondary level (Exhibit 5.6).

Exhibit 5.6.
Number of states using various measures for the *Perkins* indicator on technical skill attainment, by education level, 2011–12

Measure	Secondary	Postsecondary
National or state assessments	43	33
Course or program completion	10	9
National or state standards	5	1
Industry-recognized credential or certificate	5	3
Grade point average	4	17
Degree, certificate, or transfer from 2-year to 4-year institution	†	5

Exhibit reads: Forty-three states used national or state assessments to measured technical skill attainment at the secondary level, and 33 states did so at the postsecondary level.

† This measure is not applicable at the secondary level.
SOURCE: U.S. Department of Education, Office of Career, Technical, and Adult Education. States' Final Agreed-Upon Performance Levels, 2011–12. See http://cte.ed.gov/accountability/faupls.cfm?year=2011.

[30] For example, high school graduates with disabilities were more likely to be CTE concentrators than were those with no reported disabilities, and those who had completed lower-level mathematics courses in the ninth grade were more frequently CTE concentrators than were students who had completed higher-level courses (see Exhibit 2.5). Similarly, analyses of NAEP data indicate that CTE concentrators were less likely to perform at or above the proficient level on 12th-grade mathematics and science assessments than were non-concentrators (see Exhibit 6.2).

Local subgrantees infrequently reported using national or state exams to assess technical skill attainment for all students participating in state-approved CTE programs, and were much more likely to report using course or program completion, grade point averages, or locally-developed or institutionally-developed skill exams. For example, 56 percent of LEAs reported using course or program completion to assess all participating students, while 9 percent reported using a state-developed CTE skill exam. Similarly, 63 percent of IHEs reported using course or program completion for this purpose, while 3 percent reported using a state-developed CTE skill exam (Exhibit 5.7).

Exhibit 5.7.
Percentage of LEAs and IHEs that reported using various measures to assess technical skill attainment for all students participating in state-approved CTE programs, by education level, 2008–09

Measure	LEAs	IHEs
CTE course or program completion	56	63
Grade point average	41	53
Locally or institutionally developed skill exam	39	36
State-developed CTE skill exam	9	3
Commercially developed exam	4	3
State licensing/credentialing exam	2	3
Industry-developed, employer-validated exam	2	3
National licensing/credentialing exam	1	3

Exhibit reads: Fifty-six percent of LEA directors reported using CTE course or program completion to assess technical skill attainment for all students participating in state-approved CTE programs.

SOURCE: NACTE Surveys of LEA and IHE Directors of CTE, 2009 (*n* = 1,004 LEAs, 733 IHEs).

Accessing test data from third-party licensing and certification agencies or private third-party testing entities may present challenges. Students seeking licensure or an industry-recognized credential may have opportunities to take the assessments only a few times per year or after they have obtained a threshold amount of work experience, meaning that data may not be available at the time *Perkins* data collection occurs.[31] Citing privacy concerns, some licensing and certification organizations may decline to share assessment information with anyone other than the student. States also encountered considerable difficulty in obtaining student-level assessment records administered by other state agencies, such as state nursing boards (Data Quality Institute 2006; U.S. Government Accountability Office 2009).

States also cited cost as an impediment to offering technical skill assessments. According to the Government Accountability Office, the cost of developing statewide assessments or acquiring third-party exams can be prohibitive for some institutions or for individual students who are asked to pay for an exam (U.S. Government Accountability Office 2009).

[31] For example, the American Association of Electrodiagnostic Technologists offers three examination periods in 2014, in January, June, and October (http://www.ptcny.com/clients/AAET/index.html). Another example is Automotive Service Excellence (ASE) certification, which requires students to pass an ASE test and have relevant hands-on work experience (usually two years) (https://www.ase.com/Tests/).

Completion

Perkins IV requires states to report the percentage or number of secondary CTE concentrators who earn a high school diploma, General Educational Development (GED) credential, or other state-recognized equivalent. For postsecondary education, states are to report on CTE concentrators who earn a degree, certificate, or industry-recognized credential.

To report accurately on this indicator at the secondary level, LEAs must be able to reliably distinguish among students who drop out, transfer to another school, or graduate. GED information appears to be a challenge in some states. A Government Accountability Office study found that approximately one-third of states reported "great" or "very great" challenges in accessing GED data (U.S. Government Accountability Office 2009). States that have difficulty collecting GED award data may appear to have lower completion rates than that those have ready access to the data.

Some states struggle to obtain postsecondary certification and licensure completion data. As in the case of technical skill attainment, the timing of some assessments does not align with *Perkins* reporting requirements, and privacy concerns may prevent external organizations from sharing results with state agencies and local subgrantees. While some states collect completion data for at least some postsecondary students who earn an external credential, such as a nursing certificate awarded by a state nursing board, few states capture this information for all external credentials. Others may not include any external credentials when calculating postsecondary completion (Klein et al. 2014).

High School Graduation Rate

To support states in calculating high school graduation rates, the Department promulgated *ESEA* Title I regulations that specify how states are to report 4-year adjusted cohort graduation rates.[32] However, as with the academic attainment indicator, some states have difficulty accessing longitudinal data for CTE students or applying the methodology for calculating *ESEA* graduation rates to the subset of CTE concentrators (U.S. Government Accountability Office 2009; Richards and Schoelkopf 2008).

Almost all states reported graduation rates for CTE concentrators that were higher than the graduation rates they reported for all students under *ESEA*.

In 2011–12, two-thirds of the states reported CTE graduation rates that were 10 or more percentage points higher than the graduation rates for all students (33 states and the District of Columbia). Over half of all states (28 states and the District of Columbia) reported CTE graduation rates of 95 percent or higher in 2011–12, including eight states that reported graduation rates of 99 to 100 percent. In contrast, the highest graduation rate reported for all students under *ESEA* reporting requirements was 89 percent (in Iowa). All but one state (Nevada) reported a CTE graduation rate over 80 percent, compared with 24 states under *ESEA* reporting. Only one state (Connecticut) reported a CTE graduation rate that was lower (83 percent graduation rate for CTE concentrators vs. 85 percent for all students) (see Exhibit 5.8).

[32] Regulations for calculating *ESEA* graduation rates are listed in 34 Code of Federal Regulations § 200.19.

Exhibit 5.8.
Graduation rates for CTE concentrators as reported under *Perkins* and for all students as reported under *ESEA*, by state, 2011–12

State	*Perkins* reporting	*ESEA* reporting	Difference
District of Columbia	96	59	37
Mississippi	97	75	22
Arizona	97	76	21
South Carolina	96	75	21
Minnesota	98	78	20
Louisiana	92	72	20
Alaska	89	70	19
New Mexico	89	70	19
Michigan	95	76	19
Georgia	89	70	19
Ohio	99	81	18
Rhode Island	95	77	18
Florida	92	75	17
Delaware	97	80	17
West Virginia	96	79	17
Hawaii	99	82	17
Virginia	99	83	16
Wyoming	94	79	15
Pennsylvania	99	84	15
South Dakota	97	83	14
North Carolina	94	80	14
Oregon	82	68	14
New Jersey	100	86	14
Kansas	99	85	14
Montana	97	84	13
Illinois	94	82	12
Utah	92	80	12
Nebraska	100	88	12
Maryland	95	84	11
California	89	78	11
Arkansas	95	84	11
Alabama	86	75	11
Washington	87	77	10
Tennessee	97	87	10
Vermont	97	88	9
Missouri	95	86	9
Colorado	84	75	9
New Hampshire	95	86	9
Indiana	94	86	8
Texas	96	88	8
North Dakota	95	87	8
Nevada	70	63	7
New York	84	77	7
Wisconsin	95	88	7
Massachusetts	89	85	4
Iowa	93	89	4
Maine	88	85	3
Connecticut	83	85	–2
Idaho	99	N/A	N/A
Kentucky	97	N/A	N/A
Oklahoma	88	N/A	N/A

N/A indicates that data were not available.
SOURCES: *Perkins* Consolidated Annual Reports (*n* = 51); *ESEA* Consolidated State Performance Reports (*n* = 48).

One explanation for the wide discrepancies in graduation rates is that some states may be calculating the *Perkins* graduation rate as the percentage of 12th-grade concentrators who graduated in the reporting year (e.g., California, Kentucky, and New Hampshire), rather than as the percentage of beginning high school students who earn a diploma in the standard number of years. Since students who have persisted to the 12th grade are close to completing graduation requirements, it comes as no surprise that a very high percentage of 12th-grade CTE concentrators go on to graduate at the end of the school year. Part of the reason for this challenge may be that the definition of CTE concentrator, by its nature, implies a student who has reached 11th or 12th grade.

Postsecondary Retention or Transfer

Perkins IV requires that states report on student retention in postsecondary education, including students who transfer from a subbaccalaureate to a baccalaureate degree program. The Department's nonregulatory guidance clarifies this requirement by specifying that "retained" CTE concentrators are those who remain enrolled in their original postsecondary institution, and "transfers" are those who enroll in a different 2-year or 4-year postsecondary institution.

Unlike other measures, the retention or transfer measure, as defined in the nonregulatory guidance, looks back in time to assess student progress. Rather than exploring what percentage of the concentrator cohort transfers or is retained, the measure assesses whether students who enrolled or transferred in the current year were enrolled the previous fall. This approach limits the validity of the measure; it does not examine whether a particular cohort of concentrators continue their education (i.e., re-enroll or transfer in future terms or years). Instead, it evaluates whether concentrators and students who have already transferred were enrolled in a specific term in a previous year.

In addition, this approach may not account for the coursetaking patterns of postsecondary students who may enroll part-time or stop out and re-enroll at a later date.[33] A 2001 report found that 30 percent of the students included in the study's sample "stopped out," meaning they enrolled, did not enroll, and then enrolled again across a sequence of terms (Stratton, O'Toole, and Wetzel 2001).

Information about students who transfer also may not be accessible to all states and local subgrantees. This may occur because matching student records across postsecondary institutions — within a given institution type (e.g., 2-year institutions) or across institution types (e.g., 2-year and 4-year institutions) — poses a challenge for many states. Obtaining data from out-of-state and private institutions presents an even greater barrier, in part due to the cost of tracking student enrollments (U.S. Government Accountability Office 2009). States that do not use national databases to follow postsecondary enrollment may underreport outcomes for this indicator.

Placement

Perkins IV asks states to report secondary CTE concentrator placement in postsecondary education or training, employment, or the military, and postsecondary CTE concentrator placement in employment, an apprenticeship program, or military service. The postsecondary indicator specifies that the indicator include high-skill, high-wage, or high-demand occupations, a provision that does not appear in the secondary placement indicator. The Department's nonregulatory guidance clarifies the timeline for assessing student placement, indicating that states should evaluate student placement

[33] This issue is not limited to CTE students and applies to efforts to study the persistence of postsecondary students in general.

outcomes in the second quarter following the end of the program year, but does not indicate that the postsecondary data could include data on high-skill, high-wage, or high-demand occupations.

Most states used administrative records to report on the placement of students who exited the program.

In 2011–12, states most frequently relied on administrative records alone (33 secondary, 38 postsecondary). Some states used a combination of administrative records and surveys (11 secondary, 8 postsecondary); for example, some states used record matching for postsecondary enrollment and surveys for employment outcomes. Relatively few states relied on surveys alone (7 secondary, 5 postsecondary) (Exhibit 5.9).

Exhibit 5.9.
Number of states using surveys and/or administrative records for the *Perkins* placement indicator, by education level, 2011–12

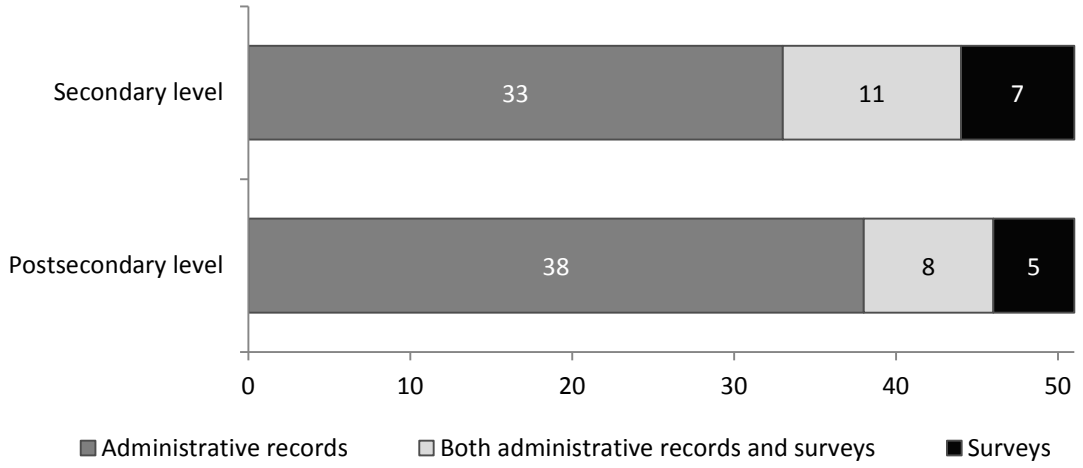

Exhibit reads: States most commonly used administrative records to measure student placement after leaving the program (33 secondary, 38 postsecondary).

SOURCE: *Perkins* Consolidated Annual Reports (*n* = 51).

Surveys may be administered at the state or local level and, depending upon the state, may involve contacting students or their families by mail or phone, online, or in person. Some states have developed standardized survey questions and methodologies that all subgrantees must implement the same way, while others allow more flexibility in the questions asked and the methods used. Reaching former students may be challenging, because their permanent addresses and phone numbers may have changed (Klein et al. 2014).

Administrative records approaches typically involve matching student records with enrollment and employment records maintained by other agencies. National sources for administrative record matching include the Federal Employment and Data Exchange System (FEDES), which contains records for those employed by the military and many branches of the federal government, and the National Student Clearinghouse (NSC), which provides information about student enrollment in more than 3,300 U.S. postsecondary institutions and covers 92 percent of U.S. college students. FEDES matches require use of Social Security numbers (SSNs), while the NSC uses a matching key

that includes name, high school attended, and birth or graduation date (Jacob France Institute 2012; National Student Clearinghouse 2014).

At the state level, unemployment insurance wage records provide employment information about individuals working in the private sector and state and local governments, but matching requires use of SSNs. Some states can match student records across K–12 schools, 2-year institutions, and 4-year institutions within their states to track student enrollment. These databases do not, however, include information about students who attend postsecondary institutions out of state (Klein et al. 2014).

At the secondary level, states most commonly used the state higher education database to obtain placement information on their students, while at the postsecondary level, the most commonly used data source was state unemployment insurance wage records.

In 2009, 21 states reported using their higher education database to collect placement data for secondary students, while 17 states used state unemployment insurance wage records. At the postsecondary level, this pattern was reversed: 33 states used state unemployment insurance wage records and 28 states used their higher education database. The two national databases (NSC and FEDES) were less commonly used than state databases but still were utilized by a number of states. Some states used more than one of these databases to track students for reporting purposes. In general, use of each administrative records resource was more frequently reported by postsecondary CTE directors than by secondary directors (Exhibit 5.10).

Exhibit 5.10.
Number of states that reported using various administrative record matching resources to collect placement data, by education level, 2009

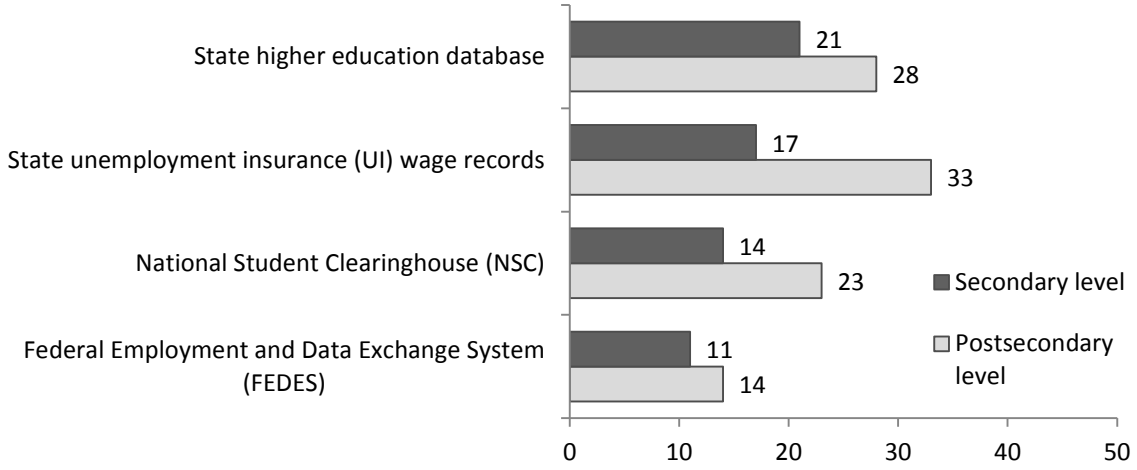

Exhibit reads: At the secondary level, states most commonly used the state higher education database to collect placement data for their students (21 states).

SOURCE: NACTE Surveys of Secondary and Postsecondary State Directors, 2009 (*n* = 51 secondary, 48 postsecondary).

State law or state interpretation of federal law sometimes prohibits the collection or use of SSNs for this type of record matching. More than half of the states (40 secondary, 32 postsecondary) identified access to SSNs as having an impact on their ability to report placement data. Even those states with

access to SSNs and state unemployment insurance wage records may not have access to individual employment information outside their state borders.[34] The majority of state directors (39 secondary, 43 postsecondary) reported that accessing out-of-state employment data had at least some impact on their ability to report placement data.

Nontraditional Participation and Completion

The nonregulatory guidance outlines two separate measures for the nontraditional participation and completion indicator. These measures evaluate students' involvement in programs leading to occupations identified as nontraditional for their gender. Nontraditional participation is the only measure that assesses the outcomes of participants rather than concentrators.

Uses of Performance Indicator Data

Most states reported using *Perkins* performance indicator data to identify programs needing improvement and to provide targeted technical assistance.

At the secondary level, in 2009, over half of the states reported using annual *Perkins* performance indicator results to identify programs needing improvement (47 states), provide targeted technical assistance (45 states), identify underserved special populations (36 states), identify unusually effective programs (35 states), and provide resources for program improvement (29 states). Similar results were found at the postsecondary level (Exhibit 5.11).

Exhibit 5.11.
Number of states that reported using annual *Perkins* performance indicator data for various purposes, by education level, 2009

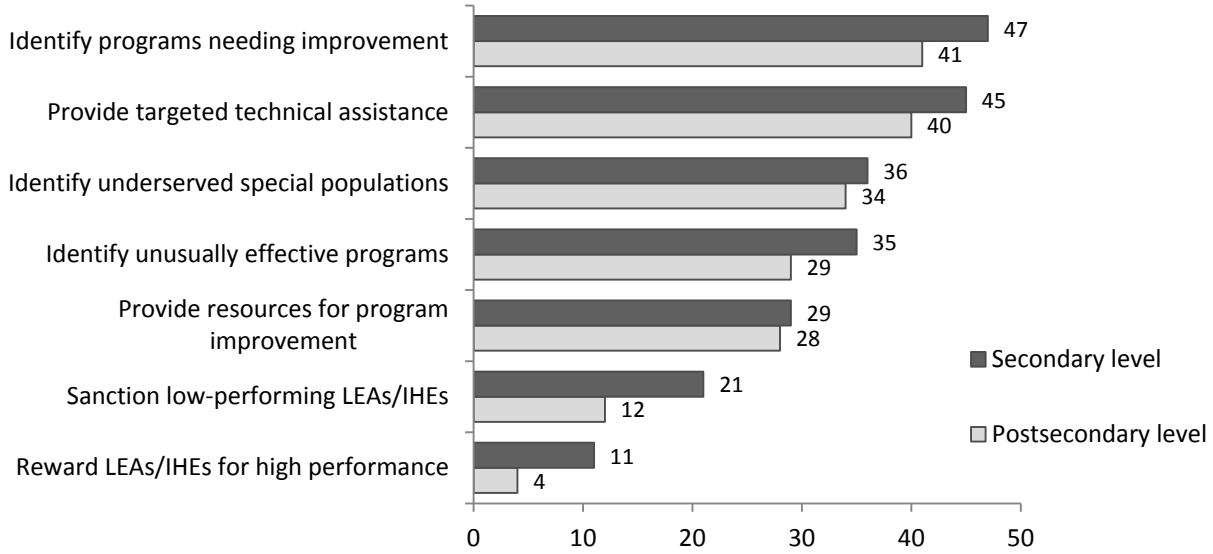

Exhibit reads: Most states used annual *Perkins* results to identify programs needing improvement (47 secondary, 41 postsecondary) and to provide targeted technical assistance (45 secondary, 40 postsecondary).

SOURCE: NACTE Surveys of Secondary and Postsecondary State Directors, 2009 (*n* = 51 secondary, 48 postsecondary).

[34] The Wage Record Interchange System (WRIS) provides out-of-state private employment data, but WRIS data currently cannot be accessed for *Perkins* reporting purposes.

States were less likely to report using core indicator data to sanction or reward subgrantees, and both sanctions and rewards were less common at the postsecondary level than at the secondary level. At both levels, states more frequently reported using core indicator data to sanction low-performing subgrantees (21 secondary, 12 postsecondary) than to reward subgrantees for high performance (11 secondary, 4 postsecondary) (Exhibit 5.11).

For local subgrantees that do not achieve 90 percent of their *Perkins* performance targets, states reported having policies to impose additional requirements or consequences (in addition to the statutory requirement to develop a local improvement plan). For such local subgrantees, states were more likely to report policies to restrict flexibility in the use of *Perkins* funds (30 secondary, 22 postsecondary) than to withhold or decrease state or *Perkins* funding (11 secondary, 9 postsecondary) or impose additional accountability reporting requirements (9 secondary, 7 postsecondary). A few states reported either imposing no consequences or responded that the consequences existed but were unlikely to be imposed (Exhibit 5.12).

Exhibit 5.12.
Number of states that reported having policies to impose various consequences on local subgrantees that did not meet 90 percent of their performance targets, by education level, 2009

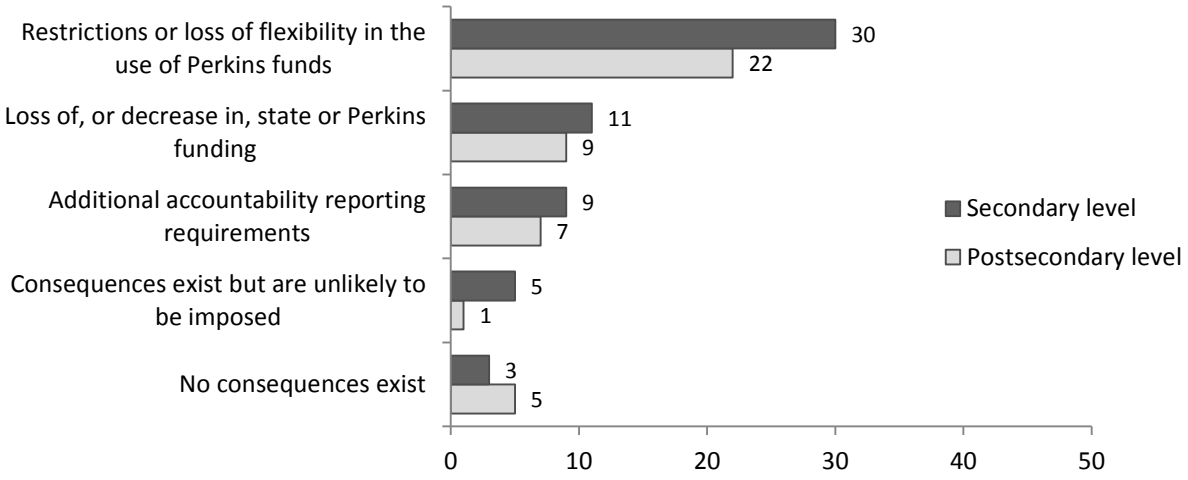

Exhibit reads: Thirty secondary state directors reported that local subgrantees that failed to meet a performance target faced restrictions or loss of flexibility in their use of *Perkins* funds.

SOURCE: NACTE Surveys of Secondary and Postsecondary State Directors, 2009 (*n* = 51 secondary, 48 postsecondary).

6

Student Outcomes

Perkins IV was intended to raise the academic and technical rigor of secondary and postsecondary CTE instruction in order to prepare students for entry into high-skill, high-wage, or high-demand occupations. Implied in this goal is an expectation that participation in CTE should be associated with improved educational and employment outcomes. However, given the variation in local policy, definitions, and outcome measures — as well as the current limitations of state education data systems — it is not possible to rely on state data alone to examine indicators of *Perkins IV* outcomes. Research on CTE therefore relies on a combination of other data sources to provide insights into the potential benefits of the *Perkins IV* statute.

Key Findings

- The percentage of high school graduates completing 4-year college preparatory coursework nearly doubled from 1990 to 2009, and CTE students showed larger increases than did non-CTE students. However, this may reflect changes in who participated in CTE rather than the impact of CTE.

- The NACTE-commissioned studies, which used quasi-experimental methods to control for student background, found that CTE coursetaking had little or no relationship with academic achievement in high school. Differences in achievement between CTE concentrators and non-concentrators were almost entirely explained by differences in student characteristics.

- High school graduates who were CTE concentrators were less likely to attend or complete postsecondary education than were non-concentrators, but studies that controlled for student background found mixed results for college-going and degree attainment.

- College-going and completion rates varied considerably by CTE concentration field, as did continuation in the same CTE field at the postsecondary level. For example:

    - As of 2006, college-going rates for 2004 high school graduates ranged from 84 percent for CTE students who had concentrated in computer and information sciences to 52 percent for concentrators in repair and transportation.

    - Continuation in the same CTE field at the postsecondary level was most common among high school graduates who concentrated in health sciences or business.

    - Completion of a postsecondary degree or certificate in the same field was most common among high school graduates who concentrated in health sciences.

- Among students who initially enrolled in subbaccalaureate programs in 2003–04, students in CTE and academic fields had attained credentials at similar rates six years later (by 2009).

- Findings on employment and earnings outcomes for CTE students were mixed. For example:

    - Eight years after graduating from high school in 2004, CTE concentrators had average hourly wages that were not statistically different — no better but no worse — than those for graduates who were non-concentrators and had the same level of postsecondary attainment.

    - For CTE concentrators who did not enroll in postsecondary education, studies show mixed findings on employment and earnings outcomes. Some studies suggest that there may be higher returns for some CTE fields (e.g., construction and architecture) and programs (e.g., career academies).

    - Six years after starting postsecondary education, students who earned a CTE certificate or associate's degree were more likely to be employed and to consider their job to be the start of a career than were those who did not earn a subbaccalaureate credential. However, students who earned a bachelor's degree had even better employment outcomes.

Background

States report a substantial amount of data on student outcomes in response to *Perkins* accountability requirements, but these data have a number of limitations affecting their use for examining overall outcomes for CTE students. For example, as discussed in Chapter 5, performance measures and definitions of CTE students differ across states, preventing the aggregation of data to obtain valid national estimates. In addition, data reported on academic attainment and graduation rate indicators may tend to exclude low-achieving students who dropped out of school prior to the 12th grade.

For these reasons, the NACTE's examination of achievement and employment outcomes for CTE students relies on other data sources, including nationally representative longitudinal datasets and quasi-experimental studies. Descriptive analyses in this chapter use NCES longitudinal datasets to examine educational and employment outcomes of CTE students, including comparisons between CTE concentrators and non-concentrators and among concentrators in different CTE fields. The chapter also summarizes findings from studies that sought to gauge the "value added" of CTE using experimental or quasi-experimental methods to control for pre-existing differences among students.[35]

It is important to note that the findings in this chapter cannot be used to draw conclusions about the effects of the *Perkins IV* statute. Due to the time required to implement policy changes and track student outcomes through graduation and beyond, as well as the timing of national and state data collection, significant time may elapse between the introduction of a new policy and the availability of valid and reliable student outcome data. For example, NCES longitudinal studies that follow nationally representative samples of high school students and postsecondary students over time generally do not yet have data on educational and employment outcomes for student cohorts entering secondary or postsecondary education after the implementation of *Perkins IV*. Consequently, this chapter uses student outcomes data from NCES studies that followed earlier student cohorts,[36] as well as data from four NACTE-commissioned studies that followed students who were enrolled in high school during the period covered by *Perkins III* (and in one case, *Perkins II*). Accordingly, although the information presented in this chapter is the most recent available, much of it addresses the outcomes of students who completed all or part of their education programs prior to *Perkins IV*. In addition, differences in how student populations are defined also may mean that students included within national analyses differ from those identified for *Perkins* purposes. In short, although this chapter does not assess the impact of *Perkins IV* on student outcomes, it does provide a summary of the most recent available information on CTE student outcomes based on NCES longitudinal and cross-sectional data as well as from recent quasi-experimental studies.

Secondary CTE Outcomes

This section examines a wide range of outcomes for secondary CTE students, including academic coursetaking, academic achievement, high school completion, postsecondary education, and employment and earnings.

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[35] Summaries of the methodology and findings for four NACTE-commissioned studies of student outcomes are provided at the end of this chapter. All four studies examined outcomes for secondary CTE students and one also examined outcomes for postsecondary CTE students. While various studies have examined the effects of secondary CTE participation on student outcomes, relatively few have investigated such effects at the postsecondary level.

[36] NCES currently has two longitudinal studies underway that will provide data on outcomes for students participating in CTE after *Perkins IV* implementation: the High School Longitudinal Study of 2009 and a new cohort for the Beginning Postsecondary Students study (i.e., students who entered postsecondary education in 2012).

Academic Coursetaking

Two sets of standards that can be used to examine the relationship between CTE coursetaking levels and students' completion of academic coursework are the New Basics core curriculum and the more challenging 4-year college preparatory coursework. The New Basics core curriculum includes four years of English and three years each of mathematics, science, and social studies. Four-year college preparatory coursework is defined as at least four credits in English; three credits in mathematics (algebra I level or higher); two credits in biology, chemistry, or physics; two credits in social studies with at least one credit in U.S. or world history; and two or more credits in a single foreign language.

The percentage of high school graduates completing the New Basics core curriculum nearly doubled from 1990 to 2009, as did the percentage completing 4-year college preparatory coursework. CTE students showed larger increases than did non-CTE students, but this may reflect changes in who participated in CTE rather than the impact of CTE.

Among high school graduates who earned four or more CTE credits, the percentage completing the New Basics curriculum increased from 18 percent in 1990 to 70 percent in 2009, and the percentage completing 4-year college preparatory coursework rose from 10 percent to 45 percent. In contrast, graduates with no CTE credits showed gains that were smaller (although still substantial); the percentage completing these courses rose from 55 percent to 80 percent for the New Basics curriculum and from 45 percent to 74 percent for 4-year college preparatory coursework (Exhibit 6.1).

Exhibit 6.1.
Percentage of public high school graduates completing the New Basics core curriculum and 4-year college preparatory coursework, by the number of occupational CTE credits earned, 1990, 2000, and 2009

CTE participation status	New Basics core curriculum			Four-year college prep coursework		
	1990	2000	2009	1990	2000	2009
4.0 or more credits	18	50	70	10	29	45
2.0–3.99 credits	39	59	75	30	44	60
0.01–1.99 credits	52	63	76	42	50	66
None	55	66	80	45	54	74
All graduates	38	58	73	29	42	56

Exhibit reads: The percentage of public high school graduates with 4.0 or more CTE credits who completed the New Basics core curriculum rose from 18 percent in 1990 to 70 percent in 2009.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Transcript Studies (HSTS) for 1990, 2000, and 2009.

Some studies that used statistical methods to control for student background characteristics have found either minimal or no relationships between CTE coursetaking and academic coursetaking. A study of Florida public high school students who were ninth-graders in 1996 found that CTE concentrators were slightly more likely than non-concentrators to complete the New Basics curriculum (Jacobson and Mokher 2014). A study of eight ninth-grade cohorts in the San Diego Unified School District from 1998 to 2006 found that students who took more CTE courses had slightly lower completion rates for coursework required for entry to California state 4-year colleges and universities compared with students who took fewer CTE courses (Betts et al. 2014). The magnitude of differences in both studies was small.

However, a more rigorous study, based on a natural experiment with random admission of students to CTE high schools in Philadelphia, found that students who attended CTE high schools were more likely to complete the college preparatory mathematics course sequence of algebra I, algebra II, and geometry than similar students who did not attend CTE high schools. The study did not find a relationship between attending a CTE school and chemistry, physics, or foreign language coursetaking (Neild, Boccanfuso, and Byrnes 2013).

Academic Achievement

CTE concentrators were much less likely than non-concentrators to score at or above the proficient level on NAEP mathematics and science assessments, but this may reflect differences in coursetaking patterns and prior achievement.

Based on the most recent NAEP for which data on coursetaking are available from the NAEP High School Transcript Study, CTE concentrators scored lower than non-concentrators in mathematics in 2005 and 2009 and in science in 2009. On the 2009 NAEP 12th-grade mathematics assessment, 16 percent of CTE concentrators scored at or above the proficient level, compared with 31 percent of non-concentrators. In science, 10 percent of CTE concentrators scored at or above the proficient level, compared with 24 percent of non-concentrators (Exhibit 6.2). These differences may be due in part to a lower level of advanced coursetaking among CTE concentrators; high school graduates who took more CTE credits were less likely to complete 4-year college preparatory coursework (see Exhibit 6.1), and those had completed more challenging mathematics courses in the ninth grade were less likely to become CTE concentrators (see Exhibit 2.5).

Exhibit 6.2.
Percentage of CTE concentrators and non-concentrators scoring at or above the proficient level on NAEP 12th-grade assessments in mathematics in 2005 and 2009 and in science in 2009

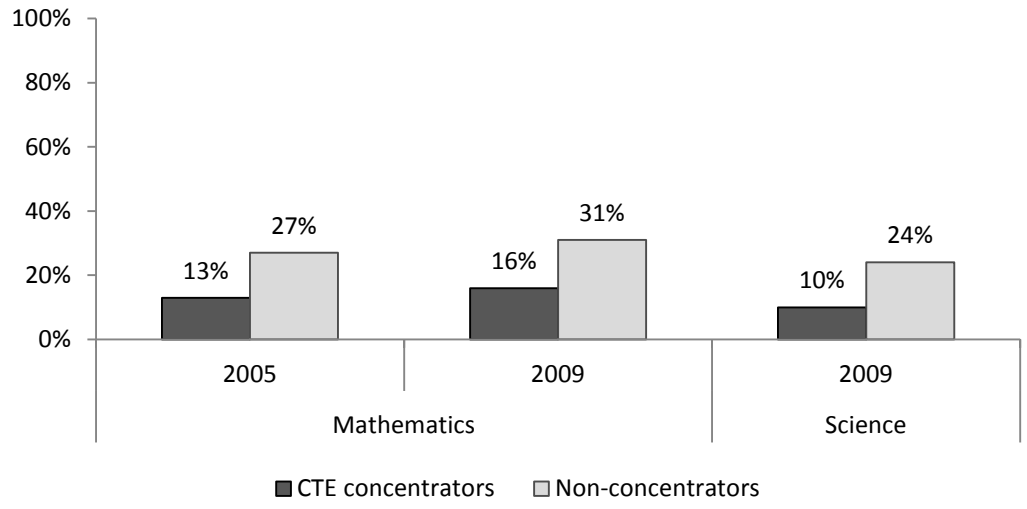

Exhibit reads: On the 2005 NAEP 12th-grade mathematics assessment, 13 percent of CTE concentrators and 27 percent of non-concentrators scored at or above the Proficient level.

NOTE: The 2009 NAEP science assessment is not comparable to earlier science assessments. Because NAEP scales are developed independently for each subject, NAEP results cannot be used to make comparisons across subjects.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2005 and 2009 High School Transcript Study (HSTS) and National Assessment of Educational Progress (NAEP) 2005 12th-grade Mathematics Assessment and 2009 Mathematics and Science Assessments.

The NACTE-commissioned studies that used quasi-experimental methods to control for student background found that CTE coursetaking had little or no relationship with academic achievement in high school. Differences in achievement between CTE concentrators and non-concentrators were almost entirely explained by differences in student characteristics.

The study of CTE high schools in Philadelphia found that CTE coursetaking had no effect on achievement in mathematics and reading comprehension for students in grades 8–11 (Neild, Boccanfuso, and Byrnes 2013). The San Diego study found that mathematics score gains showed no significant relationship with the number of CTE courses taken, while for reading, a small but statistically significant negative relationship was found (Betts et al. 2014). Finally, the analysis of longitudinal ELS data for 2004 high school graduates found that individual CTE courses had no relationship with mathematics achievement; however, the study showed slightly lower achievement for students who earned a relatively high percentage of their credits in CTE during the last two years of high school compared with students who did not take CTE courses (Bozick and Dalton 2013).

High School Completion

Evidence on the relationship between CTE concentration and high school graduation is inconclusive.

Some studies have found that CTE courses, particularly when taken early in high school, were associated with a lowered risk of dropping out, whereas others found the opposite or no link (Silverberg et al. 2004). In part, students' tendency to take CTE courses during the final two years of high school limits the influence of occupational CTE coursework on dropping out because a high percentage of students who drop out do so before their final two years (Bozick and Dalton 2013; Hampden-Thompson, Warkentien, and Daniel 2009).

Three NACTE studies examined the relationship between CTE coursetaking and high school completion among students with similar socioeconomic and academic backgrounds. The Philadelphia study found that students who attended CTE high schools had higher on-time graduation rates and 5-year and 6-year graduation rates relative to students who attended other types of high schools (Neild, Boccanfuso, and Byrnes 2013). However, the San Diego study found that CTE coursetaking or concentrator status had no relationship with the likelihood of students' graduating within five years of starting ninth grade; mixed results were found for the association between attending a CTE school and graduation rates (Betts et al. 2014). Similarly, the analysis of longitudinal ELS data found that CTE concentrators and non-CTE students had nearly the same probability of dropping out of school (Bozick and Dalton 2013).

Another recent analysis suggested that this outcome may be related to a student's age when entering the ninth grade and the proportion of CTE courses taken. Among a national sample of youths who were aged 12–17 in 1997 and followed through the early 2000s, Plank, DeLuca, and Estacion (2008) found a lower risk of dropping out among those who took CTE/academic courses in a 1:2 ratio (i.e., one-third of their total CTE and academic courses), as long as they were aged 15 or younger when they entered the ninth grade. Lower and higher proportions of CTE coursetaking were associated with increased risks of dropping out. In contrast, students who were aged 15 or older when they entered the ninth grade did not show a relationship between CTE coursetaking and drop-out rates; the authors suggested that these students may have a constellation of risk factors that diminish the potential benefits of CTE coursetaking.

Postsecondary Education and Employment

High school graduates who were CTE concentrators were less likely to attend or complete postsecondary education than were non-concentrators, but studies that controlled for student background found mixed results for college-going and degree attainment.

Longitudinal data from a study that followed 2004 high school graduates indicate that as of 2012 (eight years after graduating), 18 percent of CTE concentrators had never enrolled in postsecondary education, compared with 9 percent of non-concentrators. CTE concentrators were less likely to earn a degree or certificate during this period (50 vs. 58 percent of non-concentrators). CTE concentrators were more likely to earn a subbaccalaureate degree or certificate (23 vs. 19 percent), but they were less likely to earn a bachelor's or professional degree or certificate (27 vs. 39 percent) (Exhibit 6.3).

Exhibit 6.3.
Percentage distribution of secondary CTE concentrators and non-concentrators who earned a postsecondary degree or credential within eight years of high school graduation, by attainment status, 2012

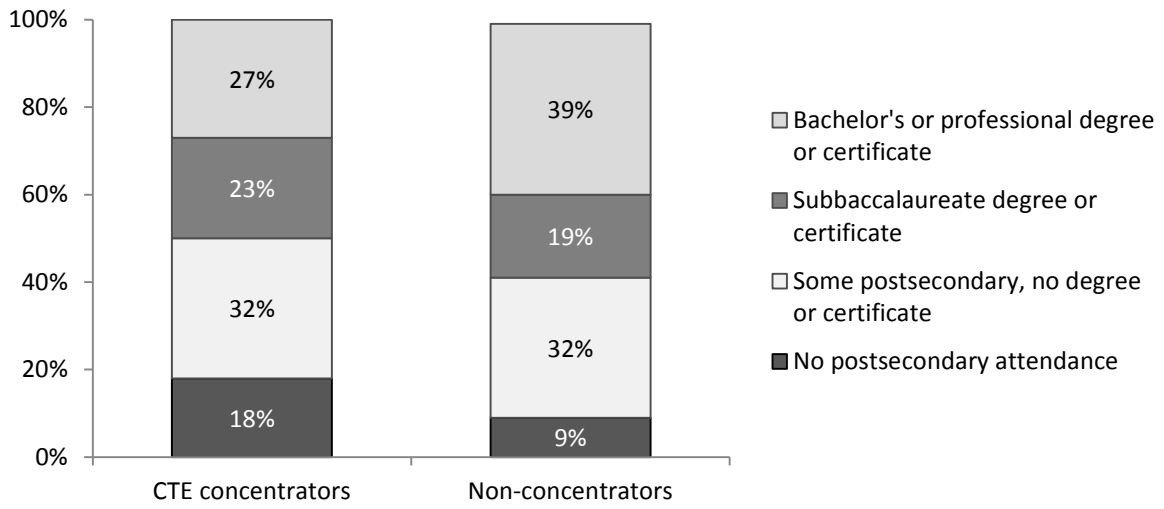

Exhibit reads: Among CTE concentrators who graduated from high school in 2004, 27 percent of CTE concentrators had earned a bachelor's or professional degree or certificate by 2012.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002), Third Follow-up Restricted-use File.

CTE concentrators were less likely than all graduates to enroll immediately and full-time (78 vs. 83 percent), less likely to enroll in a 4-year institution (48 vs. 58 percent), and more likely to work full-time while enrolled (27 vs. 21 percent). The enrollment characteristics of CTE concentrators also varied by CTE occupational area. For example, 67 percent of computer and information sciences concentrators enrolled in a 4-year institution, compared with 26 percent of repair and transportation concentrators.

However, the three NACTE studies that examined postsecondary outcomes for high school CTE concentrators found mixed results. The Philadelphia study of CTE high school applicants found some

evidence that attendance in CTE schools had a positive impact on enrollment in 2-year and 4-year colleges, but the findings were not consistent across all cohorts studied (Neild, Boccanfuso, and Byrnes 2013). The San Diego study found that CTE coursetaking — but not concentrator status — had a positive relationship with the length of time that a student was enrolled in postsecondary education during the four years after high school graduation (Betts et al. 2014). The Florida study of students who entered the ninth grade in 1996 found no difference between CTE concentrators and non-concentrators with similar backgrounds in terms of college-going, remedial coursetaking, persistence, and degree attainment (Jacobson and Mokher 2014).

College-going rates varied considerably by CTE concentration field.

Among 2004 high school graduates, the percentage who had enrolled in postsecondary education within two years (by 2006) was 70 percent for CTE concentrators, compared with 80 percent for non-concentrators. Among concentrators in specific CTE fields, the college-going rate ranged from 84 percent for CTE students who had concentrated in computer and information sciences to 52 percent for concentrators in repair and transportation (Exhibit 6.4).

Exhibit 6.4.
Percentage distribution of 2004 public high school graduates by postsecondary enrollment and employment status two years after high school, by CTE occupational field and concentrator status, 2006

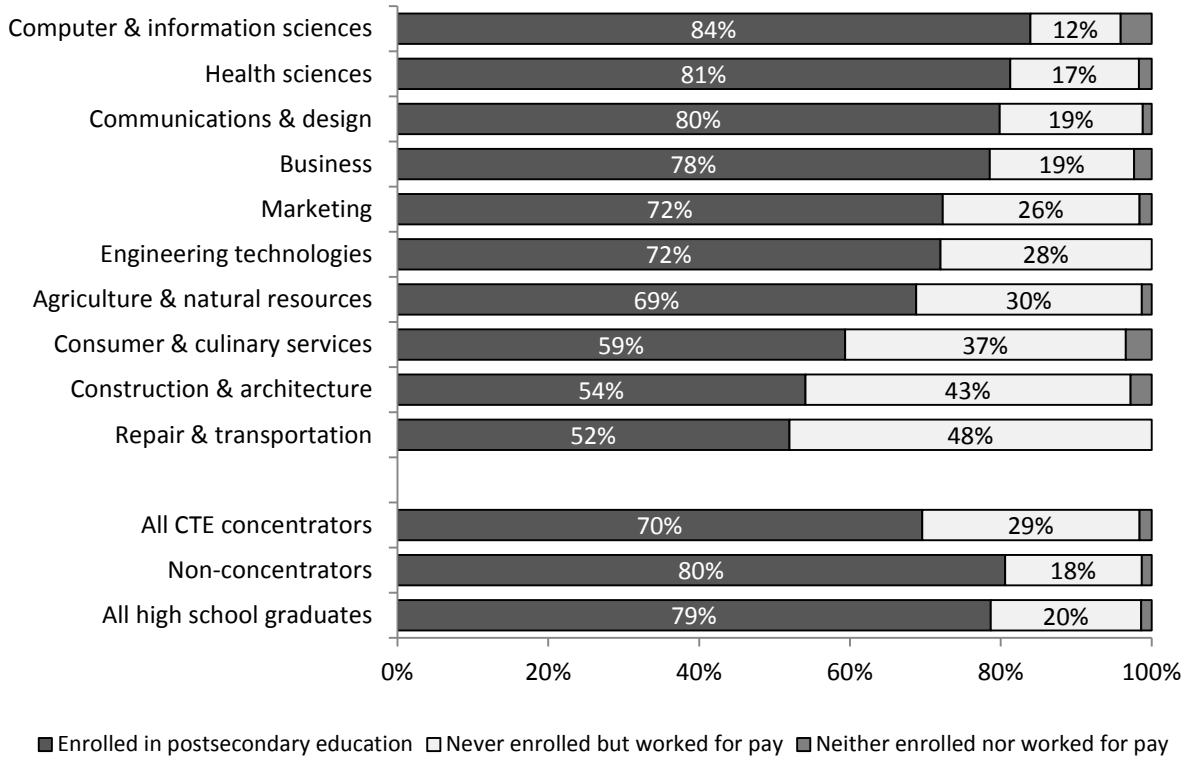

Exhibit reads: Among 2004 public high school graduates who were CTE concentrators in computer and information sciences, 84 percent had enrolled in postsecondary education by 2006, 12 percent had never enrolled in postsecondary education but had worked for pay, and 4 percent had neither enrolled nor worked for pay.

NOTES: The timeframe for postsecondary enrollment and employment was between high school graduation and the 2006 interview date. Two occupational CTE fields are not included in this chart because reporting standards were not met (manufacturing and public services).
SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002), Second Follow-up, Restricted-use File.

Continuation in the same CTE field at the postsecondary level was most common among high school graduates who concentrated in health sciences or business.

Two years after high school graduation, among 2004 high school graduates who had been CTE concentrators, 10 percent were enrolled in postsecondary fields related to their high school CTE program. Continuation in the same CTE field varied across different fields of study. For example, 19 percent of high school health science concentrators became undergraduate concentrators in the same field, as did 16 percent of high school business concentrators. In contrast, continuation in the same field was much less common among students who were high school concentrators in marketing (5 percent) or consumer and culinary services (5 percent) (Exhibit 6.5).

Exhibit 6.5.
Percentage of secondary CTE concentrators who enrolled in postsecondary education within two years of high school graduation, by same or different field of study, 2006

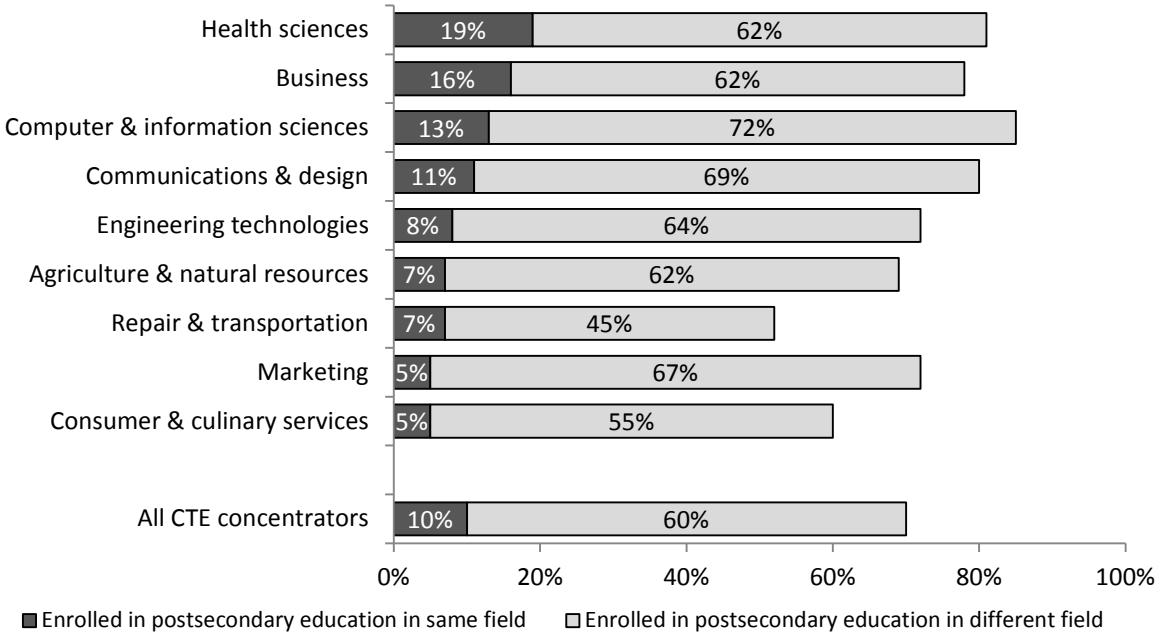

Exhibit reads: Among 2004 high school graduates who had concentrated in health sciences, 19 percent had enrolled in postsecondary education in the health sciences field by 2006, and an additional 62 percent had enrolled in postsecondary education in a different field (or had not yet declared a major or field of study).

NOTES: "Enrolled in postsecondary education but not in same field" includes students who had not yet declared a major or field of study. The timeframe for postsecondary enrollment was between high school graduation and the 2006 interview date. Three occupational CTE fields are not included in this chart because reporting standards were not met (construction and architecture, manufacturing, and public services).
SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002), Second Follow-up, Restricted-use File.

Completion of a postsecondary degree or certificate in the same field was most common among high school graduates who concentrated in health sciences.

Eight years after high school graduation, among 2004 high school graduates who had been CTE concentrators, 14 percent had completed a postsecondary degree or certificate in a field related to their high school CTE concentration, but the percentages varied significantly by field of study. Forty percent of high school health science concentrators earned a postsecondary credential in the same field, compared with 4 percent of high school concentrators in agriculture and natural resources and 9 percent of those who had concentrated in consumer and culinary services (Exhibit 6.6).

Exhibit 6.6.
Percentage of secondary CTE concentrators who earned a postsecondary degree or certificate in the same or a different field of study within eight years of high school graduation, 2012

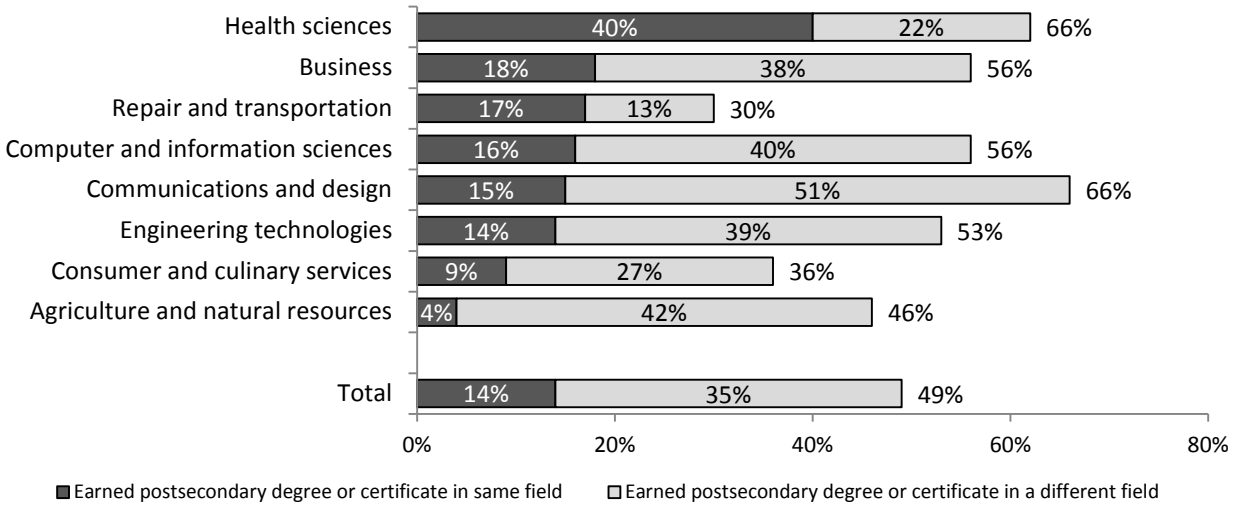

Exhibit reads: Among 2004 high school graduates who had concentrated in health sciences, 40 percent had earned a postsecondary degree or certificate in health sciences by 2012, and an additional 22 percent had earned a postsecondary degree or certificate in a different field.

NOTES: The timeframe for postsecondary enrollment was between high school graduation and the 2006 interview date. Four occupational CTE fields are not included in this chart because reporting standards were not met (construction and architecture, marketing, manufacturing, and public service).
SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002), Third Follow-up Restricted-use File.

Employment and Earnings for Non-College-Going Students

Among high school graduates who did not enroll in postsecondary education, studies have found mixed results on employment and earnings outcomes for CTE concentrators. Some studies suggest that there may be higher returns for some CTE fields (e.g., construction and architecture) and programs (e.g., career academies).

A descriptive comparison of 2004 high school graduates who worked instead of enrolling in postsecondary education within the first two years of graduation found higher rates of full-time employment among CTE concentrators (69 percent) than among non-concentrators (62 percent) (Exhibit 6.7).

Exhibit 6.7.
Among 2004 public high school graduates who worked for pay and did not enroll in postsecondary education in the first two years after high school graduation, percentage who worked full-time and average hourly wage, by CTE participation status, 2006

CTE participation status	Percent working full-time[a]	Average hourly wage[b]
CTE concentrators	69%	$10.04
Non-concentrators	62%	$9.59
Graduates by number of CTE credits		
4.00 or more credits	70%	$9.84
2.00 – 3.99 credits	62%	$9.83
0.00 – 1.99 credits	60%	$9.46
All high school graduates	64%	$9.70

Exhibit reads: Among high school graduates who worked and did not enroll in postsecondary education within two years of graduation, 69 percent of those who were CTE concentrators were working full-time in 2006, and their average hourly earnings in 2012 were $10.04.

[a] "Full-time" is defined as working 35 or more hours per week.
[b] Graduates who reported earning less than $2 per hour or more than $30 per hour were excluded (2 percent of respondents).
SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002), Second Follow-up, Restricted-use File.

Data from the Education Longitudinal Study follow-up surveys in 2006 and 2012 do not show significant differences in hourly compensation between non-college-going concentrators and non-concentrators. In 2006, both CTE concentrators and non-concentrators who had not attended postsecondary education earned an average of about $10 per hour (Exhibit 6.7). Similarly, 2012 average hourly wages for this same cohort do not show a statistically significant difference between these two groups (the two groups earned about $14–$15 per hour) (see Exhibit 6.10).

The NACTE commissioned study using Florida administrative data examined this issue by following a cohort of Florida high school students who entered the ninth grade in 1996 for 10 years, through 2007, and using statistical methods to control for differences in student characteristics. This study found that although the CTE concentrators had higher median quarterly earnings than non-concentrators, much of the difference was attributable to observed characteristics, such as work experience or academic performance. However, the study did find an earnings advantage for concentrators in some CTE fields (e.g., construction and architecture) (Jacobson and Mokher 2014).

In a randomized long-term study of students who participated in career academies in nine urban high schools, Kemple and Willner (2008) found a positive impact on earnings: students who had been enrolled in academies earned an average of 11 percent more than other students, and this effect was more pronounced for males, who had an earnings gain of 17 percent.

Postsecondary CTE Outcomes

A total of about 1.6 million subbaccalaureate credentials — either certificates or associate's degrees — were awarded in CTE fields in 2012 (see Exhibit 2.12). This chapter examines several types of outcomes for postsecondary CTE students, including persistence, academic attainment (i.e., certificates and degrees), employment rates, and earnings.

Persistence and Attainment

CTE students in certificate programs were more likely to persist and attain credentials than were CTE students in associate's degree programs. Within each of these two types of subbaccalaureate credentials, students in CTE and academic fields attained credentials at similar rates within six years.

Among 2003–04 beginning undergraduates who initially enrolled in certificate programs, 53 percent of those in CTE fields had attained a certificate or degree within six years (by 2009), compared with 54 percent of those in academic fields. Similarly, among students who enrolled in associate's degree programs, 37 percent of those in CTE fields had attained some type of credential as of 2009, as did 37 percent of those in academic fields (Exhibit 6.8).

Exhibit 6.8.
Percentage of students who began postsecondary education in 2003 who had attained various credentials or were still enrolled as of 2009 six years after initial enrollment, by postsecondary program

Initial degree program and field of study	Total attained or persisted	Total, any credential	Certificate	Associate's degree	Bachelor's degree	No credential, still enrolled
Certificate programs						
Career/technical field	60	53	50	2	1	8
Academic field	75	54	45	‡	‡	21!
Associate's degree programs						
Career/technical field	54	37	6	20	11	17
Academic field	56	37	‡	17	15	19
All subbaccalaureate programs	56	39	16	15	9	16
Baccalaureate programs	79	67	1	3	63	12
Career field	77	64	1	3	60	13
Academic field	84	73	1!	2	70	10
All beginning students	65	50	9	9	31	15

Exhibit reads: Among 2003–04 first-time undergraduates who initially enrolled in certificate programs in CTE fields of study, 60 percent had either attained a credential or were still enrolled in postsecondary education in 2009.

! Interpret data with caution. Estimate is unstable because the standard error represents more than 30 percent of the estimate.
‡ Reporting standards not met.
NOTE: CTE-focused associate's degrees are distinguished from those with an academic focus per an NCES taxonomy that can be found at http://nces.ed.gov/surveys/ctes/tables/postsec_tax.asp.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2003/04 Beginning Postsecondary Students Longitudinal Study (BPS:2004/09).

Postsecondary persistence and attainment did, however, vary by the type of credential that CTE students initially sought. Among students who initially enrolled in CTE fields of study, 53 percent of those in certificate programs had attained a certificate or degree by 2009, compared with 37 percent of those in associate's degree programs and 64 percent of those in bachelor's degree programs. Similarly, among CTE students who initially enrolled in certificate programs, the percentage who had either attained a credential or were still enrolled (60 percent) was higher than for CTE students in associate's degree programs (54 percent) but lower than for students in bachelor's degree programs in career fields of study (77 percent) (Exhibit 6.8).

Employment and Earnings

Postsecondary students who earned a CTE certificate or associate's degree were more likely to be employed and to consider their job to be the start of a career than were those who did not earn a subbaccalaureate credential. However, students who earned a bachelor's degree had even better employment outcomes.

Among 2003–04 beginning undergraduates, those who had earned a CTE certificate or associate's degree were more likely to be employed in 2009 (81 percent) than were those who had not earned a credential (75 percent). Among those who were employed, students who had earned a CTE certificate or degree were more likely than those without a credential to be employed full-time (83 vs. 79 percent) and to report that they considered their current job to be the start of a career (57 vs. 44 percent). Differences between graduates with CTE subbaccalaureate credentials and those with any subbaccalaureate credential were not statistically significant. Students who had earned a bachelor's degree had better outcomes than those with a subbaccalaureate CTE credential on two of these measures (employment rate and career starting); the difference in full-time employment rates was not statistically significant (Exhibit 6.9).

Exhibit 6.9.
Percentage of students who began postsecondary education in 2003 who had various employment outcomes in 2009, by postsecondary attainment as of 2009

Credential attained when last enrolled	Employed	Percent of those employed who were working full-time	Consider current job to be start of a career
No degree or certificate	75%	79%	44%
CTE subbaccalaureate credential	81%	83%	57%
Any subbaccalaureate credential	80%	83%	57%
Bachelor's degree	88%	87%	66%

Exhibit reads: Among 2003–04 first-time undergraduates who did not earn a degree or certificate programs within six years (by 2009), 75 percent were employed in 2009. Of those who were employed (and were not still enrolled in postsecondary education), 79 percent were working full-time and 44 percent considered their job to be the start of a career.

NOTES: Last two columns of table include only those who were employed and not still enrolled in postsecondary education in 2009.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Students who earned an undergraduate certificate or associate's degree had higher earnings than high school graduates with no postsecondary education. Earnings of high school CTE concentrators were not statistically different from those of non-concentrators who had the same level of postsecondary attainment.

Looking at a single cohort of high school graduates who had graduated in 2004 and were followed through 2012, those who earned a postsecondary certificate had average hourly wages of $15.23 in 2012, compared with $13.89 for those who did not attend postsecondary education and $13.81 for those who attended postsecondary education but did not complete a certificate or degree. Students who earned an associate's degree also had higher earnings than those that did not attend or complete a postsecondary program. However, similar comparisons for students who had been CTE concentrators in high school did not show statistically significant differences. In addition, there was not a statistically significant difference in the average hourly wages for CTE concentrators and non-concentrators with the same level of postsecondary attainment (Exhibit 6.10).

Exhibit 6.10.
Average hourly wages earned in 2012 by students who graduated from a public high school in 2004, for secondary CTE concentrators and non-concentrators, by postsecondary attainment

Postsecondary degree or certificate type	All high school graduates	CTE concentrators	Non-concentrators
No postsecondary enrollment	$13.89	$14.54	$13.65
Some postsecondary enrollment, no credential	$13.81	$14.52	$13.67
Undergraduate certificate	$15.23	$16.27	$14.97
Associate's degree	$16.14	$15.90	$16.18
Bachelor's degree	$18.87	$19.15	$18.84
Professional degree or certificate	$22.94	$22.26	$23.03

Exhibit reads: Among students who graduated from a public high school in 2004, average hourly earnings in 2012 were $13.89 for all graduates, $14.54 for CTE concentrators, and $13.65 for non-concentrators. The difference between CTE concentrators and non-concentrators was not statistically significant.

NOTE: Composite variable F3HOURWAGE was used in this analysis and provides a standard estimate of hourly wage from respondent reports of wages or salary from their current or (for those not currently employed) most recent job.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002), Third Follow-up Restricted-use File.

The above findings are descriptive and do not control for differences in student characteristics that may affect educational attainment, employment, and earnings. To better examine the relationship between postsecondary CTE education and earnings, the NACTE Florida study used multivariate and logistic regression models to estimate the association between CTE concentrator status and student outcomes while controlling for student, school, and labor market characteristics including student socioeconomic status, grade point averages, and average employment rates and earnings in the area where the student attended high school or college. The study found that postsecondary CTE concentrators[37] achieved significantly higher earnings than those who majored in academic fields;

[37] This study used student coursetaking rather than majors to determine postsecondary CTE concentrators, similar to the *Perkins* non-regulatory guidance. Specifically, the study defined postsecondary CTE concentrator as a student who either: (a) completed at least 12.0 college credits (about four semester-long courses) with a majority of those credits in one of 11 CTE occupational areas; or (b) attained a credential and took most of the courses in a CTE program area.

this earnings advantage was generally greater for students who earned a degree (rather than a certificate) and for those who found employment in an industry related to their CTE program area (Jacobson and Mokher 2014).

Among postsecondary certificate holders who were working in an occupation related to their field of study, average earnings varied considerably by field, with the highest average earnings found for those working in computer and information sciences.

Among all postsecondary certificate holders who were employed in an occupation related to their field of study, annual earnings averaged $40,000. However, some certificate holders who were working that field had higher earnings, such as those in computer and information sciences ($70,400) and drafting ($59,600). In contrast, certificate holders in some other fields had lower earnings, such as those in cosmetology ($25,200) and food services ($17,600) (Exhibit 6.11).

Exhibit 6.11.
Average annual earnings for postsecondary certificate holders working in their CTE field, for selected occupations, 2008

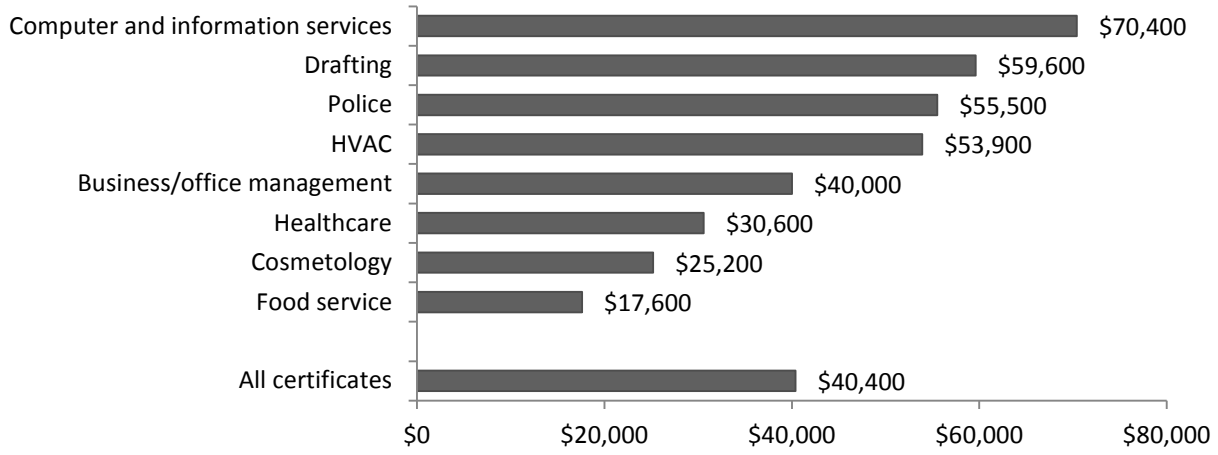

Exhibit reads: Certificate holders in computer and information sciences who were working in that field had average annual earnings of $70,400 in 2008.

SOURCE: Carnevale, Rose, and Hanson (2012), based on data from U.S. Census Bureau, Survey of Income and Program Participation (SIPP), 2004/2008.

Study Review — The Academic Impacts of Career and Technical Schools: A Case Study of a Large Urban School District

By Ruth Curran Neild, Christopher Boccanfuso, and Vaughan Byrnes

Purpose: To examine the relationship between attending a CTE high school and secondary and postsecondary educational achievement and attainment outcomes.

Setting: Public high schools (including five CTE schools) in the Philadelphia School District.

Subjects: Approximately 15,000 Philadelphia public high school students from the classes of 2003, 2004, and 2005 who applied to attend a CTE school. The analytical samples varied by analytical approach and outcome.

Research design(s): Quasi-experimental, statistical modeling; longitudinal.

Data and analysis: The analysis of secondary education outcomes used individual student records provided by the school district. These records were merged with National Student Clearinghouse data on postsecondary enrollment and completion.

Offers of admission to CTE schools were determined by a lottery that took into account student race/ethnicity (to achieve a racial balance in the schools) and how highly each student had ranked the school on his or her application form. In the latter two cohorts, the lottery was conducted after an initial screening process based on prior academic achievement and behavior.

The analysis used multi-level regression models to calculate two sets of estimates. The first set of estimates compared the outcomes of students who were accepted and not accepted to a CTE high school, using statistical models that accounted for observed and unobserved student characteristics and for students who applied to multiple schools. A second set of estimates explored the effect of the amount of time that a student actually attended a CTE school, regardless of whether he or she entered the lottery. All of the models included control variables for race/ethnicity and the ranking that the student gave to the CTE school on the application. The attendance analysis also controlled for a number of student background characteristics, such as gender, attendance, and grade point average in the eighth grade.

Findings: At the secondary level, the findings indicate that academic outcomes for CTE schools were similar to those of other schools, and in some cases, better.

- Students at CTE schools had higher rates of on-time graduation and credit accumulation within each of the three cohorts and an increased likelihood of successfully completing a college preparatory mathematics sequence of algebra I, algebra II, and geometry.
- The findings regarding CTE school attendance and completing chemistry and physics credits and two years of a foreign language were inconsistent, and CTE school attendance was not found to be associated with improvements in performance in mathematics and reading comprehension for students in grades 8–11.

Effects on CTE school attendance were smaller and less likely to be significant at the postsecondary level than at the secondary level.

- CTE school attendance was found to have a positive effect on postsecondary enrollment in 2-year and 4-year institutions, but findings were mixed across cohorts. The positive impact on postsecondary enrollment was found for all students only; when the analysis was limited to high school graduates only, no impact was found.
- Findings for the impact of secondary CTE school attendance on the number of semesters a student enrolled in postsecondary education were inconclusive, and CTE school attendance did not affect degree completion at 2-year and 4-year institutions.

Methodological and data limitations: Random assignment can potentially eliminate the bias caused by the sorting of students into schools or programs on the basis of interest, ability, or other factors, but pure random assignment is generally not possible when evaluating educational programs. The Philadelphia CTE lottery was not strictly random in several respects.

First, the lottery assigned offers of admission, and students could choose whether they actually wanted to attend. As a result, the groups of students who did and did not choose to attend a CTE school may have been different in ways for which the study did not account. Additionally, a proportion of students attended the CTE schools without participating in the lottery, and lottery information was missing for some students who applied.

The study included methodological strategies to address biases associated with these factors, but these limitations should be considered when interpreting the findings.

Conclusions: Overall, the study found that the average academic outcomes of CTE school attendance equaled, and in some cases exceeded, those of other district schools. Among the 2003 to 2005 cohorts of Philadelphia high school students, attendance at CTE schools increased a student's probability of on-time graduation and successful completion of a college preparatory mathematics sequence of algebra I, algebra II, and geometry. Attendance at these schools may also increase the rates at which students enroll in 2-year and 4-year postsecondary institutions.

Attendance at CTE schools, however, did not affect students' completion of physics and chemistry courses and of two years of foreign language, their performance in mathematics and reading comprehension tests, and their overall high school GPA. Finally, CTE school attendance did not appear to have an effect on postsecondary outcomes for these cohorts.

Study Review — Career and Technical Education in San Diego: A Statistical Analysis of Course Availability, Students' Coursetaking Patterns, and Relationships with High School and Postsecondary Outcomes

By Julian R. Betts, Andrew Zau, John McAdams, and Dallas Dotter

Purpose: To examine the availability of CTE courses and high school students' coursetaking patterns and to assess the impact of CTE coursetaking on secondary and postsecondary educational outcomes.

Setting: 43 high schools in the San Diego Unified School District (SDUSD).

Subjects: Eight cohorts of high school students who entered grade nine from 1998 to 2006. The district enrolled an average of about 9,900 ninth-grade students in each of the years studied, but the analytical sample sizes varied by outcome.

Research design: Quantitative case study; longitudinal, statistical modeling.

Data and analysis: The study analyzed SDUSD administrative records on students and teachers that were merged with data from the National Student Clearinghouse to include information on postsecondary education. The data included year-to-year information on student coursetaking, attendance, grades, test scores, high school completion, and postsecondary enrollment and completion.

The analysis used multivariate regression models that included various methodologically rigorous strategies to isolate the influence of CTE coursetaking and account for differences between CTE and non-CTE students. The models used to analyze changes in mathematics and reading achievement included fixed-effects and instrumental variables to account for unobserved student characteristics. Estimates of one-time outcomes, such as high school completion, also used instrumental variables and controlled for students' prior academic achievement.

Findings: After controlling for student background and other variables, most analyses found little relationship between CTE coursetaking in high school and secondary academic achievement or postsecondary outcomes.

- Students in the middle of the distribution of prior academic achievement (as measured by grade point average in the eighth grade) were the most likely to become CTE concentrators, followed by students at the top. Students with the lowest levels of prior academic achievement were the least likely to become concentrators.

- The number of occupational CTE courses taken had a small negative relationship with reading scores but no relation to mathematics scores. CTE coursework had a weak negative relationship with completion of a college preparatory curriculum but had no relation to absences or grade promotion.

- Occupational CTE coursetaking or concentrator status was not associated with the probability of graduating from high school within five years, passage of the California High School Exit exam, or overall GPA.

- High school CTE coursetaking was associated with an increase in the length of time that a student was enrolled in postsecondary education during the first four years after high school graduation, but it was not associated with 2-year or 4-year postsecondary degree attainment.

- Some CTE occupational areas showed significant positive and negative associations with postsecondary outcomes. For example, three-course concentrators in computer

information sciences in high school were significantly more likely to obtain a 2-year or 4-year degree than those who did not become CTE concentrators, while concentrators in construction during high school were significantly less likely to obtain either degree.

Methodological and data limitations: The students analyzed in this study were not randomly assigned to courses or schools, and students who took CTE courses may have differed from students in ways that could affect their educational outcomes. Multiple strategies were used to account for unobserved differences between CTE and non-CTE students and strengthen the causal claims linking coursetaking and outcomes, but analyses may have omitted unobserved factors associated with the outcomes analyzed that could bias the findings.

The analysis of postsecondary attainment was limited to four years, a shorter period than the six-year postsecondary completion rates used in many studies. This shorter time period would not account for students who took longer to complete their degrees, such as students who worked while enrolled or those who transferred from 2-year to 4-year institutions.

Conclusions: CTE coursetaking in San Diego was found to have little association with secondary or postsecondary outcomes. While some analyses found positive or negative associations between CTE coursetaking and student outcomes, these associations were generally weak and may be explained by factors other than CTE coursetaking.

Study Review — Florida Study of Career and Technical Education

By Louis Jacobson and Christine Mokher

Purpose: To examine the association between concentrating in a CTE program at the secondary and postsecondary levels and education and workforce outcomes. These outcomes included completion of the high school curriculum required for entrance to a Florida public university, postsecondary enrollment, post-high school employment and earnings, college coursetaking, postsecondary persistence and completion, and post-college employment and earnings.

Setting: Public high schools and 2-year and 4-year public postsecondary institutions in Florida.

Subjects: 84,700 ninth-grade students who attended public high schools in Florida and reached the 12th grade. The cohort was followed from 1996 through 2007; analytical sample sizes varied by outcome due to data limitations.

Research design: Longitudinal; statistical modeling.

Data and analysis: The study used student records data provided by the Florida Department of Education to follow a cohort of students who were in the ninth grade in 1996 over a 10-year period (through 2007). The secondary and postsecondary records data were matched to employment information from Florida quarterly unemployment insurance wage records from 1995 to 2007.

The analysis used multivariate and logistic regression models to estimate the association between CTE concentrator status and student outcomes.[38] The models controlled for student, school, and labor market characteristics that past research has indicated to be associated with postsecondary outcomes.

Findings: At the secondary level, the findings suggest that concentrating in a CTE program has little influence on outcomes among Florida high school students. The study found:

- Twelfth-grade CTE concentrators were more likely than non-concentrators to complete the curriculum required for entrance to public 4-year institutions in Florida, but the difference was small (82 vs. 78 percent).
- High school CTE concentrators were more likely than non-concentrators to concentrate in a CTE program at the postsecondary level. Across all high school CTE concentrators, 16 percent concentrated in the same program area at the secondary and postsecondary levels, but this percentage varied widely by program.
- Concentrators and non-concentrators with similar background and academic characteristics had similar college and career outcomes after graduation. High school CTE concentrators were as likely as non-concentrators to attend college, take remedial courses once enrolled, persist in higher education, and attain a credential. Among students who did not enroll in college, both groups had similar employment rates and earnings.

Among postsecondary graduates, significant earnings differences were found between postsecondary CTE concentrators and non-concentrators after controlling for observable differences between the two groups.

- Depending on the CTE program and credential attained, median earnings for CTE concentrators were from $849 to $2,665 per quarter higher than for non-concentrators who majored in academic or humanities fields.

[38] Secondary CTE concentrators were students who had completed at least 3.0 CTE credits (equivalent to three year-long courses) in one of 12 occupational areas in high school. A postsecondary CTE concentrator was defined as a student who either: (a) completed at least 12.0 college credits (about four semester-long courses) with a majority of those credits in one of 11 CTE occupational areas; or (b) attained a credential and took most of the courses in a CTE program area.

- CTE concentrators employed in industries related to their CTE program area had higher earnings than those employed in nonrelated industries. Earnings for CTE concentrators employed in an industry related to their program area were 9 percent higher for students with certificates, 54 percent higher for students with associate's degrees, and 30 percent higher for students with bachelor's degrees, relative to those employed in non-related industries.

  This earnings advantage varied by occupational field. For example, among students with associate's degrees, the earnings advantage for working in field was 102 percent for the health care field, 32 percent for the protective services field, and 7 percent for the education field.

Methodological and data limitations: The data used in the study are observational, and students were not randomly assigned to courses or schools. The analyses controlled for observable student characteristics but may have excluded unobserved differences between the groups that could also affect the outcomes of interest. The study, therefore, could not show that CTE coursetaking caused various outcomes, but instead it provided a comparison of outcomes of CTE concentrators and non-concentrators with similar academic backgrounds.

The data were limited to students who attended public high schools and postsecondary institutions in Florida. The analysis, therefore, excludes high school dropouts, students who transferred to private high schools or to high schools in other states, and students who did not enroll in college or who attended a private or out-of-state college. Employment data were only available for students employed in Florida and covered by the state's employment insurance system.

Conclusions: Among Florida high school graduates who attended public schools, the study did not find an association between concentrating in a CTE field at the secondary level and postsecondary career and educational outcomes among students with similar academic and background characteristics. In contrast, postsecondary graduates who were CTE concentrators appeared to earn more than graduates who majored in academic fields. The earnings advantage was even greater among concentrators employed in an industry related to their CTE program area.

Study Review — Career and Technical Education and Academic Progress at the End of High School: Evidence from the Education Longitudinal Study of 2002

By Robert Bozick and Ben Dalton

Purpose: To examine the association between CTE coursetaking and mathematics achievement and the likelihood of dropping out of high school.

Setting: U.S. public high schools.

Subjects: High school students in grades 11 and 12 who were in grade 10 in spring 2002. The analysis of mathematics achievement included about 7,000 students, and the analysis of school leavers included about 11,300 students.

Research design: Longitudinal; statistical modeling.

Data and analysis: This study used data from the Education Longitudinal Study of 2002, a nationally representative longitudinal study of 2002 high school sophomores. The data included in the analysis were from the baseline year, a first follow-up in the spring of 2004 when most of the students were high school seniors, and a transcript study, which collected transcripts beginning in winter 2004–05. The analysis of mathematics achievement used fixed-effects regression analysis to control for student self-selection into CTE and academic courses. The dropout analysis estimated the influence of CTE coursetaking on the risk of dropping out for each semester in which a student was enrolled and included control variables for a range of demographic and academic student characteristics.

Findings: Among students with similar background and academic characteristics, the overall number of CTE courses taken was not related to mathematics achievement or the risk of dropping out of high school. The study did find, however, evidence that the relative proportion of CTE versus academic credits in a student's transcript were related to both mathematics achievement and the risk of dropping out.

Findings on mathematics achievement included:

- Concentrators had slightly lower mathematics achievement gains than students who earned only academic credits, but the difference was small. Students who earned three credits in CTE courses were predicted to answer one fewer question correctly on an 81-item assessment than students who earned exclusively academic credits.
- The acquisition of basic and intermediate mathematics skills was similar among CTE students and students who earned only academic credits. However, students who earned two CTE credits were slightly less likely than their peers who earned only academic credits to be proficient at an advanced level.
- Traditional academic mathematics courses were positively associated with achievement; but the same was not found for STEM (science, technology, engineering, and mathematics) courses offered through the CTE curriculum.

Findings regarding the probability of dropping out of high school included:

- Dropouts and enrolled students earned similar numbers of CTE credits, but dropouts accumulated fewer academic credits.
- Students who earned a high proportion of CTE credits relative to academic credits had a higher probability of dropping out, but this relationship only held when the overall number of academic credits earned was small. Students who earned a large number of both academic and CTE credits were no more likely than other students to drop out, and concentrators and non-concentrators had similar probabilities of dropping out.

Methodological and data limitations: Because the study relied on observational data rather than the random assignment of students to courses, unobserved differences between CTE and other students could influence outcomes and bias the findings. The study included methodological strategies to account for selection bias, but both analyses may have omitted unobserved factors associated with the outcomes that could bias the findings.

The analytical sample for mathematics achievement excluded the relatively small proportion of students who attended private schools and a relatively larger number for whom interview or transcript data were missing. As a result, the study included fewer economically disadvantaged students, racial/ethnic minorities, and low-achieving students than were present in the entire cohort, and the findings may be less applicable to these groups. Furthermore, student coursetaking patterns limited the dropout analysis to students in grades 11 and 12 only because most CTE courses are taken during the last two years of high school. As the study notes, as many as one-half or more of students who drop out do so prior to their junior year.

Conclusions: The findings suggest that students who take relatively more CTE courses than academic courses perform lower on mathematics tests and have a higher probability of dropping out of high school than students who take academic courses exclusively. These findings, however, were small and largely attributable to pre-existing differences between students with a CTE-focused curriculum relative to students with an academic-focused curriculum.

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Appendix A. NACTE Independent Advisory Panel

The NACTE Independent Advisory Panel was created to advise the U.S. Department of Education on the design and implementation of the NACTE, as required in the Congressional mandate for the NACTE. The panel met seven times throughout the conduct of the NACTE and provided input on study designs, preliminary findings, and draft reports. The panel also prepared its own report to Congress (*Putting "career" in "college and career ready": The report of the Independent Advisory Panel of the National Assessment of Career and Technical Education*, 2014).

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Appendix B. Methodology

The NACTE summarizes data collected on the implementation and outcomes of programs supported under *Perkins IV*, including information from a study of *Perkins* implementation, commissioned studies of CTE student outcomes, reviews of existing research, and analyses of extant data sources. This appendix provides a brief description of the samples, data collection, and other methodological features of each data source; more detailed information can be found in study-specific reports and (for NCES datasets) on the NCES website.

Evaluation of the Implementation of the *Carl D. Perkins Career and Technical Education Act*

This study, commissioned for the NACTE, conducted surveys, case studies, and analyses of extant data to provide information on the implementation of *Perkins IV* provisions for finance, accountability, and programs of study. The study surveyed state directors responsible for overseeing *Perkins* implementation at the secondary and postsecondary levels in the 50 states and the District of Columbia, as well as local program directors in a stratified random sample of 1,993 LEAs, 48 independent area CTE centers, and 1,006 IHEs. These surveys are referred to in this report as "NACTE surveys" (i.e., in source notes for exhibits). The surveys were administered in fall 2009, and response rates were 100 percent for state secondary directors, 94 percent for state postsecondary directors, 77 percent for LEAs, 93 percent for area CTE centers, and 91 percent for IHEs. (In this report, survey data for area CTE centers were combined with LEA data due to the small sample size for the CTE centers.) Case studies were conducted in six states and 18 local communities (three per state, including one urban, one suburban, and one rural); these case studies included site visits and in-depth interviews.

For the fiscal analyses contained in Chapter 3, suballocation data for the 2009–10 program year were obtained from 50 secondary and 49 postsecondary directors. Targeting analyses in this chapter were conducted by Policy and Program Studies Service staff; these analyses combined suballocation data collected through this study with Census Bureau poverty and population data for school districts (from the small area estimates program), as well as with NCES Common Core of Data (CCD) data on enrollments and urbanicity (locale).

Commissioned Studies of CTE Student Outcomes

As part of the NACTE, the Department commissioned four independent studies that used longitudinal student-level data to examine the relationship between high school students' participation in CTE and secondary and postsecondary outcomes, with each study using different methodological approaches and data sources. These four studies primarily examined CTE students who were enrolled in high school during the period prior to the implementation of *Perkins IV*; this approach was chosen in order to follow students over a longer period of time than was possible for the period covered by *Perkins IV* implementation at the time these studies were initiated.

- **Philadelphia.** This study took advantage of a natural experiment involving a lottery to select student applicants to attend CTE high schools. The study used individual student records provided by the district, merged with National Student Clearinghouse data on postsecondary enrollment and completion, following students from the classes of 2003, 2004, and 2005 to examine a range of outcomes including coursetaking, high school graduation rates, and postsecondary attendance and completion. The analysis used multi-level regression models to compare outcomes for students who were accepted and not accepted to a CTE high school and also explored the effect of the amount of time that a student actually attended a CTE school on outcomes.

- **San Diego.** This study used a fixed-effects model to examine the association between student CTE coursetaking and academic outcomes, following eight cohorts of high school students who entered ninth grade between 1998 and 2006. The study used individual student records provided by the district and merged them with postsecondary data from the National Student Clearinghouse. The data included student coursetaking, attendance, grades, test scores, high school completion, and postsecondary enrollment and completion.

- **Florida.** This study analyzed individual secondary and postsecondary student records from the Florida Department of Education that tracked students who were in ninth grade in 1996 for 10 years, through 2007. The analysis used multivariate and logistic regression models to examine whether there was a relationship between CTE participation and student outcomes.

- **Analysis of Education Longitudinal Study of 2002 (ELS) data.** This study used a fixed-effects model and data from a nationally representative longitudinal study of 2002 high school sophomores to examine the associations between CTE coursetaking and high school outcomes. The data included in the analysis were from the baseline year, a first follow-up in the spring of 2004 when most of the students were high school seniors, and a transcript study, which collected transcripts beginning in the winter of 2004–05.

Reviews of Existing Research

Study staff conducted a literature search to identify published reports that examined the implementation of *Perkins* and career and technical education more generally, as well as student outcomes for career and technical education.

Analyses of Extant Data

The NACTE also drew upon existing data from a variety of sources, including annual state reports as well as longitudinal and cross-sectional studies sponsored by NCES. Each of these data sources is described below. Many of the NCES statistics found in this report were previously prepared through the NCES Career/Technical Education Statistics (CTES) system and are available at http://nces.ed.gov/surveys/ctes/index.asp.

- **Annual state reports.** As required under *Perkins*, states submit Consolidated Annual Reports (CARs) to the U.S. Department of Education, as well as annual updates to their *Perkins* state plans. These annual reports include information on performance indicator targets and results, as well as certain data on state allocation of Perkins funds. These data are stored in a *Perkins* database system maintained by the Office of Career, Technical, and Adult Education, and the data are available at http://cte.ed.gov/accountability/reports.cfm. In

addition, the NACTE used state-reported data from *ESEA* Consolidated State Performance Reports (CSPRs) for data on *ESEA* performance indicators, for comparison purposes. The CSPR data are collected and maintained through the ED*Facts* database system; the CSPR data used in this report are available at http://eddataexpress.ed.gov.

The most recent *Perkins* and *ESEA* performance indicator data available are for the 2011–12 school year. In this report, CAR data are used in Exhibits 3.5, 3.6, 5.2, 5.5, 5.8, 5.9, D.8, D.9, and D.13, and CSPR data are used in Exhibits 5.5, 5.8, and D.13.

- **Education Longitudinal Study of 2002 (ELS).** This longitudinal study initially surveyed a national sample of students who were in 10th grade in 2002 — as well as their parents, teachers, librarians, and schools — and then conducted periodic follow-up surveys to monitor the students' progress through high school and on to postsecondary education and the workforce. The ELS focused on the educational, vocational, and personal development of students at various stages in their educational careers and the personal, familial, social, institutional, and cultural factors that may affect that development. In addition to the base year data collection in 2002, three follow-up surveys were conducted in 2004, 2006, and 2012. The base year surveys collected a range of data from and about the sampled students, including their high school experiences, performance on assessments, coursetaking patterns, and plans and expectations for the future, as well as their parents' plans and expectations for their children's future. The 2004 follow-up survey again examined the high school experiences of the cohort, most of whom were then in the 12th grade. For those who had graduated from or dropped out of high school, the 2004 survey focused on retrospective experiences in high school, postsecondary education, and labor force participation. The second and third follow-ups focused on the current educational and labor market status of the cohort, such as high school completion; postsecondary education, including field of study, credential attainment and degree completion; employment, income, and family formation. In this report, ELS data are used in Exhibits 6.3, 6.4, 6.5, 6.6, 6.7, and 6.9.

  Over the history of the ELS, student response rates have been high; weighted response rates in the base year were 68 percent for schools and 87 percent for the student questionnaire. In the first follow-up year (2004), the weighted response rates were 89 percent for the student questionnaire and 91 percent for the high school transcripts. In the second and third follow-up years, the rates were 88 percent and 84 percent, respectively. In the 2012 follow-up, response rates were 84 percent for the 2002 sophomore cohort was 84 percent and 85 percent for the 2002 senior cohort. For more information on ELS, see http://nces.ed.gov/surveys/els2002/.

- **National Assessment of Educational Progress (NAEP) and the High School Transcript Study (NSTS).** NAEP is a nationally representative and ongoing assessment of what students in the United States know and can do in mathematics, reading, science, writing, the arts, civics, economics, geography, and U.S. history. NAEP is administered to students, with students in grades 4, 8, and 12 typically taking part in mathematics, reading, and science assessments every two years. HSTS was conducted in 2005 and 2009, collecting transcripts for all students who graduated during the school year. HSTS enables analyses of student coursetaking, credits earned, and grade point averages and allows these data to be linked to the NAEP assessments and student background questionnaires, which collect information about student characteristics.

In this report, HSTS data are used in Exhibits 2.1, 2.2. 2.3, 2.4, 2.5, 6.1, and 6.2, and NAEP assessment data are used in Exhibit 6.2. Although NAEP assessment data are now available for 2013, this report uses NAEP data for 2009 because it is the most recent year for which data on coursetaking is available from the HSTS, in order to compare NAEP results for CTE concentrators and non-concentrators. For more information about NAEP and the HSTS, see http://nces.ed.gov/nationsreportcard/.

- **Schools and Staffing Survey (SASS).** This system of surveys collects information on a range of issues relevant to elementary and secondary education through questionnaires administered to school districts, schools, principals, and teachers. SASS includes traditional public schools and public charter schools, schools operated by the Bureau of Indian Affairs, and private schools. Topics covered include teacher supply and demand, teacher and administrator characteristics, school programs, and general conditions in schools, as well as staff perceptions of school climate, hiring and compensation, and student characteristics. In this report, SASS data are used to examine the characteristics of CTE teachers and academic teachers, including educational background, certification, and professional development. SASS data are used in Exhibits 2.6, 2.7, and 2.8.

  SASS has been conducted periodically since the mid-1980s; the most recent data available are for 2011–12. Weighted response rates for the 2011–12 SASS were 81 percent for the school district questionnaire, 73 percent for the school questionnaire, 73 percent for principals, and 62 percent for teachers. For more information on SASS, see http://nces.ed.gov/surveys/sass/.

- **Integrated Postsecondary Education Data System (IPEDS).** This annual universe data collection gathers information from every college, university, and technical and vocational institution that participates in federal student financial aid programs. Collected data include information about institutional characteristics (e.g., levels of awards offered, types of programs, admission requirements); institutional prices (e.g., tuition and fees); student enrollment (e.g., enrollment by student characteristics, incoming student counts); student financial aid; degrees and certificates conferred (reported by type of program and level of award, including CTE programs); student persistence and success (retention and graduation rates), and; institutional human and fiscal resources (e.g., staff counts, salaries, and characteristics, and detailed revenues and expenditures). In this report, IPEDS data are used in Exhibits 2.9, 2.10, 2.12, 2.13, D.2, D.3, and D.4.

  Because reporting to IPEDS is mandatory for programs that participate in federal student financial aid programs, the response rate for IPEDS is nearly 100 percent. IPEDS data are available for 1980 and annually since 1984; the most recent IPEDS data available are for 2012. For more information on IPEDS, see http://nces.ed.gov/ipeds/.

- **National Postsecondary Student Aid Study (NPSAS).** Based on a large, nationally representative sample of postsecondary institutions and students, NPSAS is the primary resource for analyzing financial aid for postsecondary students in the United States, but it also can be used to estimate characteristics of Title IV-eligible institutions and the students who are enrolled in them. The periodic NPSAS data collections draw data from multiple sources, including postsecondary institution records, federal financial aid databases, and student surveys. NPSAS student-level data collection includes, among other things, information on student demographics, education, and work experiences. In this report, NPSAS data are used in Exhibits 2.9, 2.10, 2.11, and 2.14.

Response rates for the 2011–12 NPSAS were high, with 88 percent of sampled institutions providing lists of enrolled students and 92 percent providing detailed information on sampled students. Among eligible students, 69 percent completed the student survey. For more information on NPSAS, see http://nces.ed.gov/surveys/npsas/.

- **Beginning Postsecondary Students Longitudinal Study (BPS).** This periodic study leverages the NPSAS collection, following the subset of students who were identified in the certain NPSAS cohorts as being first-time postsecondary students. The BPS then conducts follow-up surveys of these students at three points in time: at the end of their first year, and then three and six years after they first started postsecondary education. BPS surveys collect information on student demographic characteristics, school and work experiences, persistence, transfer, and degree attainment.

  The most recent BPS data collection (BPS:04/09) followed a cohort of students who started their postsecondary education for the first time during the 2003–04 academic year at any Title IV-eligible postsecondary institution in the United States; these students were surveyed again in 2006 and in 2009. In addition to survey data, student transcripts were collected, enabling analyses by fields of study, including CTE. In this report, BPS data are used in Exhibit 6.8.

  The response rate for BPS:04/09 was 82 percent. For more information on the BPS, see http://nces.ed.gov/surveys/bps/.

Significance Testing

For original analyses conducted for the NACTE, references in the text to differences between groups or over time that are based on sample data only discuss differences that are statistically significant using a significance level of 0.05. The significance level, or alpha level, reflects the probability that a difference between groups as large as the one observed could arise simply due to sampling variation, if there were no true difference between groups in the population. A failure to reach this level of statistical significance does not necessarily mean that two groups were the same or that there was no change over time; a lack of statistically significant findings simply means that no reliable conclusion can be drawn from the analyses that were conducted. The tests were conducted by calculating students' *t*-statistic, which tests the difference between two sample estimates. The *t*-test formula was not adjusted for multiple comparisons. Standard error tables for exhibits that are based on sample data are included in Appendix C.

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Appendix C. Standard Error Tables

In the following tables, standard errors are provided in parentheses after each estimate.

Exhibit C.1. Standard Errors for Exhibit 2.1. Percentage of public school graduates who earned one or more occupational CTE credits, by occupational area, 2009

Curricular area	Any credits	At least one credit	At least two credits	At least three credits
Any CTE occupational area	84.9 (0.61)	76.1 (0.79)	53.2 (1.02)	36.2 (1.02)
Same CTE occupational area	†	†	35.5 (0.93)	19.1 (0.77)
Business	32.5 (1.05)	22.7 (0.86)	6.6 (0.39)	2.4 (0.17)
Communications and design	29.6 (0.91)	19.5 (0.65)	5.8 (0.29)	2.2 (0.13)
Computer and information sciences	21.2 (0.87)	12.9 (0.60)	3.1 (0.23)	1.0 (0.13)
Consumer and culinary services	18.0 (0.62)	10.2 (0.48)	4.2 (0.27)	2.4 (0.18)
Manufacturing	12.9 (0.52)	8.4 (0.44)	2.8 (0.21)	1.3 (0.15)
Engineering technologies	11.1 (0.62)	8.3 (0.56)	2.2 (0.14)	0.9 (0.09)
Agriculture and natural resources	10.7 (0.58)	8.7 (0.54)	4.3 (0.34)	2.6 (0.24)
Health sciences	10.3 (0.65)	8.1 (0.57)	4.0 (0.31)	2.6 (0.25)
Public services	9.6 (0.56)	6.6 (0.49)	1.5 (0.16)	0.6 (0.10)
Marketing	8.5 (0.54)	5.6 (0.45)	1.9 (0.24)	0.9 (0.12)
Repair and transportation	8.0 (0.43)	6.0 (0.36)	3.3 (0.26)	2.1 (0.24)
Construction and architecture	6.7 (0.44)	5.0 (0.35)	2.0 (0.21)	1.1 (0.11)

† Not applicable.
SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Transcript Study (HSTS), 2009.

Exhibit C.2. Standard Errors for Exhibit 2.2. Percentage of public high school graduates who earned occupational CTE credits, for selected years from 1990 to 2009

Amount of occupational CTE credits earned	1990	2000	2005	2009
Any occupational CTE credit	88.2 (0.78)	89.0 (0.78)	87.0 (0.45)	84.9 (0.61)
One or more occupational CTE credits	77.9 (1.12)	79.8 (1.24)	78.6 (0.62)	76.1 (0.79)
Three or more credits in same CTE occupational area	23.8 (0.96)	22.7 (1.26)	20.9 (0.60)	19.1 (0.77)

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 1990, 2000, 2005, and 2009.

Exhibit C.3. Standard Errors for Exhibit 2.3. Average number of credits earned by public high school graduates during high school, by curricular area, and percentage of total credits in each area, 1990 and 2009

Curricular area	Average credits in 1990	Average credits in 2009	Percent of total in 1990	Percent of total in 2009
Total credits	23.5 (0.13)	26.9 (0.10)	100.0	100.0
Occupational CTE	2.7 (0.06)	2.5 (0.06)	11.4 (0.23)	9.0 (0.19)
Non-occupational CTE	1.5 (0.05)	1.1 (0.03)	6.5 (0.21)	4.1 (0.10)
Enrichment/other	2.7 (0.07)	3.4 (0.05)	11.3 (0.28)	12.6 (0.17)
Academic	16.7 (0.11)	20.0 (0.08)	70.7 (0.40)	74.4 (0.32)

NOTE: Enrichment includes credits earned in areas such as health, physical, and recreational education; religion and theology; and military science, among other areas. Detail may not sum to totals due to rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 1990 and 2009.

Exhibit C.4. Standard Errors for Exhibit 2.4. Percentage change in the percentage of public school graduates who earned occupational CTE credits, by occupational area, 1990 and 2009

Occupational area	1990	2009
Health sciences	3.2 (0.65)	10.3 (0.65)
Public services	3.8 (0.70)	9.6 (0.56)
Communications and design	18.4 (0.88)	29.6 (0.91)
Consumer and culinary services	13.8 (1.02)	18.0 (0.62)
Agriculture and natural resources	9.1 (0.90)	10.7 (0.58)
Marketing	8.5 (0.56)	8.5 (0.54)
Construction and architecture	7.4 (0.54)	6.7 (0.43)
Computer and information sciences	25.1 (1.47)	21.2 (0.87)
Engineering technologies	13.7 (0.58)	11.1 (0.62)
Repair and transportation	10.1 (0.71)	8.0 (0.43)
Business	51.7 (1.49)	32.5 (1.05)
Manufacturing	22.4 (1.26)	12.9 (0.52)
Any CTE occupational area	88.2 (0.78)	84.9 (0.61)

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Transcript Study (HSTS), 1990 and 2009.

Exhibit C.5. Standard Errors for Exhibit 2.5. Percentage of public high school graduates who were CTE concentrators, by student characteristics, 1990 and 2009

Student characteristic	1990	2009
Mathematics course completion in 9th grade		
Geometry or higher	9.3 (1.19)	14.0 (0.85)
Algebra	17.9 (0.91)	20.1 (0.94)
Below algebra or no mathematics	32.9 (1.44)	24.2 (1.14)
Disability status in grade 12		
Students with disabilities	36.8 (3.93)	27.2 (1.57)
Students with no reported disability	23.5 (0.94)	18.4 (0.76)
Limited English proficiency in grade 12		
Limited English proficient	11.5 (5.40)!	12.9 (1.43)
No reported limited English proficiency	23.9 (0.95)	19.3 (0.79)
Race/ethnicity		
White	24.4 (1.08)	20.0 (0.91)
Black	24.4 (2.20)	22.9 (1.68)
Hispanic	24.1 (2.23)	17.1 (1.24)
Asian	11.8 (2.95)	7.3 (1.22)
American Indian	30.0 (4.99)	17.5 (2.59)
Other	‡	13.9 (2.94)
Sex		
Male	25.2 (1.17)	21.1 (0.97)
Female	22.6 (1.16)	17.2 (0.70)
All CTE concentrators	23.8 (0.96)	19.1 (0.77)

! Interpret data with caution. Estimate is unstable because the standard error represents more than 30 percent of the estimate.
‡ Reporting standards are not met; the standard error represents more than 50 percent of the estimate.
SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Transcript Study (HSTS), 1990 and 2009.

Exhibit C.6. Standard Errors for Exhibit 2.6. Percentage of grade 9–12 public school teachers who had attained bachelor's degree or higher and a master's degree or higher, by main teaching assignment and CTE occupational area, 2011–12

Main teaching assignment and CTE occupational area	Bachelor's degree or higher	Master's degree or higher
Main teaching assignment		
CTE education	81.7 (1.91)	46.3 (2.40)
Academic education	97.0 (0.27)	58.6 (0.81)
All subjects	95.4 (0.35)	57.3 (0.67)
CTE occupational area		
Marketing	99.1 (1.12)	62.7 10.42)
Business	96.4 (1.74)	64.4 (4.50)
Agriculture and natural resources	93.3 (3.86)	37.6 (5.96)
Computer and information sciences	89.8 (3.60)	57.5 (7.06)
Communications and design	82.5 (5.83)	52.1 (8.32)
Health sciences	80.8 (5.43)	36.2 (9.55)
Consumer, culinary, and public services	72.0 (7.29)	47.8 (7.32)
Construction, architecture, and engineering technologies	69.2 (4.95)	32.3 (5.53)
Manufacturing	46.7 (12.91)	‡
Repair and transportation	25.8 (6.84)	12.3 (4.17) !

! Interpret data with caution. Estimate is unstable because the standard error represents more than 30 percent of the estimate.
‡ Reporting standards are not met; the standard error represents more than 50 percent of the estimate.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), Public School Teacher Questionnaire, 2011–12.

Exhibit C.7. Standard Errors for Exhibit 2.7. Percentage distribution of grade 9–12 public school teachers' type of certification, for CTE occupational teachers and academic teachers, 2011–12

Type of certification	Occupational CTE teachers	Academic teachers
Regular state certification	84.9 (1.65)	91.4 (0.55)
Provisional certification [a]	13.5 (1.65)	7.7 (0.44)
No certification	1.5 (0.37)	1.0 (0.43)

[a] Includes certificates issued after satisfying all requirements except the completion of a probationary period and certificates that require additional coursework, student teaching, passage of a test, or completion of a certification program.
NOTE: Detail may not sum to 100 percent due to rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), Public School Teacher Questionnaire, 2011–12.

Exhibit C.8. Standard Errors for Exhibit 2.8. Percentage distribution of grade 9–12 public school teachers who participated in professional development, for CTE occupational teachers and academic teachers, 2011–12

Number of professional development hours	Occupational CTE teachers	Academic teachers
More than 32 hours	28.5 (2.30)	28.4 (0.88)
17 to 32 hours	29.6 (2.31)	23.7 (0.83)
9 to 16 hours	26.1 (2.49)	26.7 (0.82)
Less than 9 hours	15.8 (1.62)	21.2 (0.96)
More than 17 hours	58.1 (2.44)	52.1 (0.96)

SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), Public School Teacher Questionnaire, 2011–12.

Exhibit C.9. Standard Errors for Exhibit 2.9. Percentage distribution of students seeking subbaccalaureate CTE credentials, by type of institution, 2011–12

Type of institution	Subbaccalaureate credential	Certificate	Associate's degree
4-year institutions	**12.8 (0.57)**	**8.2 (0.75)**	**15.2 (0.82)**
Public	5.2 (0.44)	4.3 (0.56)	5.6 (0.63)
Private not-for-profit	1.7 (0.24)	1.5 (0.47)	1.8 (0.27)
Private for-profit	5.9 (0.32)	2.4 (0.28)	7.8 (0.44)
2-year institutions	**77.2 (0.63)**	**63.2 (1.41)**	**84.8 (0.82)**
Public	64.7 (0.73)	40.0 (1.86)	78.1 (0.90)
Private not-for-profit	1.2 (0.13)	2.1 (0.35)	0.6 (0.14)
Private for-profit	11.3 (0.28)	21.1 (1.04)	6.1 (0.51)
Less-than-2-year institutions	**10.0 (0.28)**	**28.5 (1.08)**	†
Public	1.3 (0.11)	3.8 (0.32)	†
Private not-for-profit	# (†)	0.4 (0.29)	†
Private for-profit	8.5 (0.24)	24.3 (0.95)	†

† Not applicable.
# Rounds to zero.
NOTES: This exhibit provides standard errors for the last column of Exhibit 2.9 (percentage distribution of students seeking a subbaccalaureate credential), as well as estimates and standard errors for the distribution of students seeking a CTE certificate and the distribution of students seeking a CTE associate's degree, which are not included in Exhibit 2.9. In addition, Exhibit C.9 does not include standard errors for the first four columns of Exhibit 2.9 because those data are from IPEDS, which is a universe survey. Detail may not sum to totals due to rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2011–12 National Postsecondary Student Aid Study (NPSAS:12).

Exhibit C.10. Standard Errors for Exhibit 2.11. Number and percentage distribution of credential-seeking undergraduates in subbaccalaureate programs, by credential goal and career field of study, 2011–12

CTE occupational field	Number of subbaccalaureate students	Percent of all subbaccalaureate students	Percent seeking a certificate	Percent seeking an associate's degree
Any CTE occupational area	**8,402,703**	**100.0**	**20.7 (0.63)**	**79.3 (0.63)**
Health sciences	3,032,440	36.1 (0.70)	25.7 (1.17)	74.3 (1.17)
Business	1,411,844	16.8 (0.38)	6.8 (0.75)	93.2 (0.75)
Manufacturing, construction, repair, and transportation	591,916	7.0 (0.38)	42.3 (3.07)	57.7 (3.07)
Personal and consumer services	575,744	6.9 (0.45)	64.0 (2.40)	36.0 (2.40)
Military technology and protective services	538,484	6.4 (0.25)	5.0 (0.88)	95.0 (0.88)
Computer and information sciences	532,711	6.3 (0.26)	9.6 (1.20)	90.4 (1.20)
Engineering, architecture, and science technologies	524,716	6.2 (0.22)	12.0 (1.52)	88.0 (1.52)
Education	469,631	5.6 (0.29)	9.6 (2.24)	90.4 (2.24)
Public, legal, and social services	380,848	4.5 (0.24)	9.3 (1.45)	90.7 (1.45)
Communications and design	252,069	3.0 (0.19)	6.8 (1.48)	93.2 (1.48)
Agriculture and natural resources	92,302	1.1 (0.10)	9.4 (3.09)	90.6 (3.09)

NOTES: Business and marketing includes business management, business support, and marketing. Detail may not sum to totals due to rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2011–12 National Postsecondary Student Aid Study (NPSAS:12).

Exhibit C.11. Standard Errors for Exhibit 2.14. Percentage distribution of undergraduate students enrolled in selected types of degree and certificate programs, by demographic characteristics, 2011–12

Student characteristic	Any certificate	CTE-focused associate's degree	Any bachelor's degree
Age group, as of 2012			
Under 25	45.1 (1.02)	49.2 (0.56)	70.7 (0.47)
25 to 34	29.7 (0.92)	29.3 (0.49)	17.4 (0.32)
Over 34	25.2 (0.92)	21.5 (0.45)	11.9 (0.33)
Income quartile, 2010			
Lowest quartile	32.3 (1.00)	27.7 (0.47)	21.7 (0.25)
Second quartile	27.6 (0.84)	26.5 (0.43)	23.7 (0.30)
Third quartile	20.4 (0.80)	25.2 (0.44)	25.4 (0.32)
Highest quartile	19.7 (1.26)	20.6 (0.48)	29.2 (0.32)
Parent's highest level of education			
Less than high school	10.0 (0.55)	9.1 (0.31)	4.9 (0.18)
High school diploma or equivalent	33.3 (1.11)	29.7 (0.47)	20.9 (0.28)
Some college, no bachelor's degree	25.2 (0.94)	29.9 (0.48)	24.9 (0.29)
Bachelor's degree or higher	24.4 (1.06)	26.6 (0.50)	47.3 (0.38)
Unknown	7.1 (0.53)	4.6 (0.23)	2.0 (0.12)
Race/ethnicity			
Asian	3.2 (0.36)	4.3 (0.28)	6.7 (0.21)
Black or African American	21.6 (1.59)	18.8 (0.56)	14.3 (0.32)
Hispanic or Latino	19.8 (1.12)	18.1 (0.61)	13.0 (0.35)
White	51.5 (1.53)	54.2 (0.79)	61.6 (0.47)
Other	4.0 (0.42)	4.5 (0.25)	4.4 (0.16)
Sex			
Male	35.3 (1.02)	41.6 (0.46)	45.0 (0.25)
Female	64.7 (1.02)	58.4 (0.46)	55.0 (0.25)

NOTES: Other races include American Indian, Alaska Native, those of two or more races, and those of other (unspecified) race. For income quartile, parents' income was used if student is dependent; student's own income (and spouse's income, if applicable) is used if student is independent. Income rankings compare the student only to other students with the same dependency status. Detail may not sum to 100 percent due to rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2011–12 National Postsecondary Student Aid Study (NPSAS).

Exhibit C.12. Standard Errors for Exhibit 3.14. Percentage of secondary and postsecondary local subgrantees who reported using *Perkins* Title I funds for permissive uses, 2008–09

Permissive use	Secondary	Postsecondary
Leasing, purchasing, upgrading, or adapting equipment	70.2 (1.41)	75.8 (0.92)
Providing career guidance and academic counseling	67.7 (1.44)	80.5 (0.88)
Implementing POS	57.8 (1.50)	61.1 (1.08)
Promoting work-related experiences for students	55.7 (1.53)	57.0 (1.09)
Providing programs for special populations	53.4 (1.52)	69.2 (1.03)
Assisting CTE student organizations	42.8 (1.52)	23.4 (0.94)
Supporting nontraditional training and activities	39.1 (1.50)	60.6 (1.07)
Involving business and labor in designing, implementing, and evaluating CTE programs	37.2 (1.49)	44.6 (1.10)
Developing new CTE courses	36.0 (1.47)	45.7 (1.07)
Supporting teacher preparation programs	34.9 (1.48)	31.9 (1.02)
Promoting industry experiences for teachers	34.8 (1.48)	40.2 (1.08)
Improving accountability data collection and reporting	39.8 (1.44)	35.8 (1.05)
Offering mentoring and related support services	27.5 (1.39)	47.7 (1.11)
Providing training programs in automotive technologies	22.7 (1.28)	39.8 (1.08)
Providing entrepreneurship education and training	17.5 (1.17)	13.8 (0.76)
Offering continuing education or job referral services	13.0 (1.06)	26.9 (0.98)
Offering programs for adults and school dropouts	†	25.7 (0.95)
Supporting family and consumer sciences programs	†	14.9 (0.78)
Creating small, personalized career-themed learning communities	†	10.5 (0.66)

† Not applicable. Survey of LEA directors did not include this subitem.
SOURCE: NACTE Surveys of LEA and IHE Directors, 2009 (*n* = 1,021 LEAs, 748 IHEs).

Exhibit C.13. Standard Errors for Exhibit 4.2. Average number of POS reported by local directors in states using each strategy, by education level, 2008–09

POS development strategy	As reported by LEA CTE directors	As reported by IHE CTE directors
State-developed	10.2 (0.65)	18.1 (1.13)
Locally-developed	8.7 (0.65)	17.6 (0.72)
Locally-developed with state guidance	8.3 (0.68)	16.0 (0.75)
Locally-developed without state guidance	7.0 (1.30)	17.0 (1.43)
Overall average	11.5 (0.62)	22.3 (0.81)

NOTE: Some states used more than one approach (for example, four states reported that locally-developed POS included POS developed with state guidance as well as POS developed without state guidance).
SOURCE: NACTE Surveys of LEA and IHE Directors, 2009 (*n* = 687 LEAs, 549 IHEs).

Exhibit C.14. Standard Errors for Exhibit 4.3. Percentage of LEA and IHE directors reporting that various stakeholders participated "a lot" in POS development, 2008–09

Stakeholder group	As reported by LEA CTE directors	As reported by IHE CTE directors
Secondary CTE teachers	66.2 (0.61)	37.4 (0.73)
Postsecondary CTE faculty	16.4 (1.23)	59.5 (0.45)
LEA administrators	36.7 (0.88)	19.5 (0.85)
Postsecondary administrators	9.1 (1.38)	52.0 (0.46)
Secondary academic teachers	14.1 (1.31)	11.6 (1.01)
Postsecondary academic faculty	7.9 (1.43)	27.2 (0.89)
Local business, unions	13.4 (1.16)	27.2 (0.70)
National industry, union groups	5.5 (1.50)	13.1 (0.98)
Local chamber of commerce	5.0 (1.55)	6.2 (1.08)

SOURCE: NACTE Surveys of LEA and IHE Directors, 2009 (*n* = 1,001 LEAs, 736 IHEs).

Exhibit C.15. Standard Errors for Exhibit 4.4. Percentage of LEA and IHE directors reporting that at least one of their five highest-enrollment POS had certain linkages between secondary and postsecondary education, 2008–09

POS component	LEA directors	IHE directors
Spans secondary and postsecondary	67.8 (1.45)	70.4 (1.03)
Non-duplicative across secondary and postsecondary	42.3 (1.57)	59.0 (1.12)
Opportunity for dual or concurrent enrollment	58.2 (1.53)	76.0 (0.97)

SOURCE: NACTE Surveys of LEA and IHE Directors, 2009 (*n* = 981 LEAs, 714 IHEs).

Exhibit C.16. Standard Errors for Exhibit 4.5. Percentage of LEA and IHE directors reporting that at least one of their five highest-enrollment POS was part of an articulation agreement, 2008–09

POS component	Agreement with one or more IHEs or LEAs	Agreement with two or more IHEs or LEAs
Percent of LEA directors reporting that at least one of their five highest-enrollment POS was part of an articulation agreement with a postsecondary institution	61.8 (1.43)	36.3 (1.52)
Percent of IHE directors reporting that at least one of their five highest-enrollment POS was part of an articulation agreement with a school district	63.5 (1.04)	58.3 (1.12)

SOURCE: NACTE Surveys of LEA and IHE Directors, 2009 (*n* = 980 LEAs, 710 IHEs).

Exhibit C.17. Standard Errors for Exhibit 4.6. Percentage of LEA and IHE directors reporting that at least one of their five highest-enrollment POS led to certain credentials, 2008–09

POS component	LEA directors	IHE directors
Industry-recognized or sponsored credential	46.5 (1.50)	77.6 (0.95)
Postsecondary certificate	43.4 (1.53)	80.0 (0.90)
Associate's degree	32.5 (1.49)	76.7 (0.94)
Bachelor's degree	21.9 (1.34)	32.1 (1.07)

SOURCE: NACTE Surveys of LEA and IHE Directors, 2009 (*n* = 974 LEAs, 712 IHEs).

Exhibit C.18. Standard Errors for Exhibit 5.4. Percentage of LEAs and IHEs reporting various methods for identifying CTE concentrators, 2009

Identification method	LEA directors	IHE directors
Local administrators identify students using local management information systems	57.4 (1.52)	59.6 (1.10)
Teachers/faculty identify students based on coursetaking	49.9 (1.56)	25.3 (0.95)
State administrators identify students using statewide database	25.7 (1.36)	34.4 (1.06)
Students self-report concentrator status	12.4 (1.03)	19.9 (0.89)
Don't know	8.7 (0.84)	5.4 (0.50)

NOTE: Survey respondents could report using more than one method.
SOURCE: NACTE Surveys of LEA and IHE Directors of CTE, 2009 (*n* = 1,014 LEAs, 736 IHEs).

Exhibit C.19. Standard Errors for Exhibit 6.1. Percentage of public high school graduates completing the New Basics core curriculum and 4-year college preparatory coursework, by the number of occupational CTE credits earned, 1990, 2000, and 2009

CTE participation status	New Basics core curriculum			Four-year college prep coursework		
	1990	2000	2009	1990	2000	2009
4.0 or more credits	18.1 (1.97)	50.1 (2.59)	69.7 (1.02)	9.5 (0.89)	29.0 (1.93)	45.2 (0.89)
2.0–3.99 credits	38.7 (1.90)	59.0 (2.00)	75.2 (1.03)	29.5 (1.51)	43.6 (1.71)	60.1 (1.08)
0.01–1.99 credits	52.2 (2.43)	62.5 (2.11)	75.8 (1.41)	41.7 (1.96)	49.8 (1.89)	66.4 (1.52)
None	54.6 (3.02)	66.1 (2.90)	80.1 (2.41)	45.4 (2.70)	53.5 (2.97)	73.5 (2.64)
All graduates	38.1 (1.70)	57.9 (1.72)	73.4 (0.81)	28.7 (1.18)	41.8 (1.37)	56.4 (0.82)

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Transcript Studies (HSTS) for 1990, 2000, and 2009.

Exhibit C.20. Standard Errors for Exhibit 6.2. Percentage of CTE concentrators and non-concentrators scoring at or above the proficient level on NAEP 12th-grade assessments in mathematics in 2005 and 2009 and in science in 2009

Postsecondary attainment status	CTE concentrator	Non-concentrator
Mathematics — 2005	13.0 (1.40)	26.7 (1.00)
Mathematics — 2009	16.2 (1.05)	30.5 (1.52)
Science — 2009	10.3 (3.70)	23.5 (5.10)

NOTE: The 2009 NAEP science assessment is not comparable to earlier science assessments. Because NAEP scales are developed independently for each subject, NAEP results cannot be used to make comparisons across subjects.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2005 and 2009 High School Transcript Study (HSTS) and National Assessment of Educational Progress (NAEP) 2005 12th-grade Mathematics Assessment and 2009 Mathematics and Science Assessments.

Exhibit C.21. Standard Errors for Exhibit 6.3. Percentage distribution of secondary CTE concentrators and non-concentrators who earn a postsecondary degree or credential within eight years of high school graduation, by attainment status, 2012

Postsecondary attainment status	CTE concentrator	Non-concentrator
No postsecondary attendance	17.6 (1.40)	9.3 (0.52)
Some postsecondary attendance, no credential	32.5 (1.64)	32.4 (0.67)
Subbaccalaureate degree or certificate	23.1 (1.59)	19.0 (0.64)
Bachelor's or professional degree or certificate	26.8 (1.74)	39.3 (0.89)

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002), Third Follow-up Restricted-use File.

Exhibit C.22. Standard Errors for Exhibit 6.4. Percentage distribution of 2004 public high school graduates by postsecondary enrollment and employment status two years after high school, by CTE occupational field and concentrator status, 2006

CTE occupational area	Enrolled in postsecondary education	Never enrolled but worked for pay	Neither enrolled nor worked for pay
Computer and information sciences	84.3 (5.59)	11.6 (4.07)	4.1 (3.76)
Health sciences	80.8 (5.25)	17.5 (5.17)	1.7 (1.39)
Communications and design	80.3 (4.47)	18.5 (4.49)	1.2 (1.01)
Business	78.3 (2.99)	19.4 (2.82)	2.3 (1.12)
Marketing	72.1 (5.18)	26.3 (5.03)	1.6 (1.24)
Engineering technologies	72.0 (7.49)	28.0 (7.49)	‡
Agriculture and natural resources	69.1 (4.78)	29.6 (4.68)	1.3 (0.93)
Consumer and culinary services	59.3 (4.50)	37.4 (4.49)	3.4 (1.87)
Construction and architecture	54.5 (8.59)	42.7 (8.08)	2.8 (2.09)
Repair and transportation	52.0 (4.33)	48.0 (4.33)	‡
All CTE concentrators	69.9 (1.64)	28.6 (1.60)	1.6 (0.39)
Non-concentrators	80.4 (0.71)	18.3 (0.68)	1.3 (0.17)
All high school graduates	78.7 (0.66)	20.0 (0.63)	1.4 (0.16)

‡ Reporting standards are not met; the standard error represents more than 50 percent of the estimate.
NOTE: The timeframe for postsecondary enrollment and employment was between high school graduation and the 2006 interview date. Detail may not sum to 100 percent due to rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002), Second Follow-up Restricted-use File.

Exhibit C.23. Standard Errors for Exhibit 6.5 Percentage of secondary CTE concentrators who enrolled in postsecondary education within two years of high school graduation, by same or different field of study, 2006

Main teaching assignment and CTE occupational area	Enrolled in postsecondary education in same field of study	Enrolled in postsecondary education but not in the same field of study
All CTE concentrators	**9.7 (1.01)**	**60.1 (1.65)**
Health sciences	18.7 (4.39)	61.8 (5.94)
Business	16.3 (3.06)	62.0 (4.09)
Computer and information sciences	12.6 (4.99) !	71.7 (6.83)
Communications and design	10.9 (3.00)	69.4 (5.29)
Engineering technologies	7.5 (3.65) !	64.5 (8.97)
Agriculture and natural resources	7.5 (2.39) !	61.6 (3.69)
Repair and transportation	7.3 (2.39) !	44.7 (4.43)
Marketing	5.5 (2.55) !	66.6 (5.59)
Consumer and culinary services	4.6 (2.02) !	54.7 (4.72)

! Interpret data with caution. Estimate is unstable because the standard error represents more than 30 percent of the estimate.
NOTES: "Enrolled in postsecondary education but not in the same field of study" includes students who had not yet declared a major or field of study. Timeframe for postsecondary enrollment was between high school graduation and the 2006 interview date. Three occupational CTE fields are not included in this chart because reporting standards were not met (construction and architecture, manufacturing, and public services).
SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002), Second Follow-up Restricted-use File.

Exhibit C.24. Standard Errors for Exhibit 6.6
Percentage of secondary CTE concentrators who earned a postsecondary degree or certificate in the same or a different field of study within eight years of high school graduation, 2012

Main teaching assignment and CTE occupational area	Earned postsecondary degree or certificate in same field of study	Earned postsecondary degree or certificate in different field of study
All CTE concentrators	**13.7 (1.74)**	**35.2 (1.13)**
Health sciences	39.5 (5.58)	22.3 (5.36)
Business	17.7 (3.33)	38.1 (4.07)
Repair and transportation	17.2 (4.12)	13.1 (3.24)
Computer and information sciences	16.3 (5.83)	40.1 (8.05)
Communications and design	15.2 (4.29)	50.8 (5.65)
Engineering technologies	14.3 (5.58)	38.5 (7.54)
Consumer and culinary services	8.6 (3.12)	26.6 (4.88)
Agriculture and natural resources	3.9 (1.67)	41.6 (5.12)

NOTES: The timeframe for postsecondary enrollment was between high school graduation and the 2006 interview date. Four occupational CTE fields are not included in this chart because reporting standards were not met (construction and architecture, marketing, manufacturing, and public service).
SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002),Third Follow-up Restricted-use File.

Exhibit C.25. Standard Errors for Exhibit 6.7.
Among 2004 public high school graduates who worked for pay and did not enroll in postsecondary education in the first two years after high school graduation, percentage who worked full-time and average hourly wage, by CTE concentrator status and number of CTE credits earned, 2006

CTE participation status	Percent working full-time[a]	Average hourly wage[b]
CTE concentrators	68.8	$10.04
Non-concentrators	62.1	$9.59
Graduates by number of CTE credits		
4.00 or more credits	69.8	$9.84
2.00 – 3.99 credits	62.1	$9.83
0.00 – 1.99 credits	59.9	$9.46
All high school graduates	63.7	$9.70

[a] "Full-time" is defined as working 35 or more hours per week.
[b] Graduates who reported earning less than $2 or more than $30 per hour were excluded (2 percent of respondents)
SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002), Second Follow-up Restricted-use File.

Exhibit C.26. Standard Errors for Exhibit 6.8. Percentage of students who began postsecondary education in 2003 who had attained various credentials or were still enrolled as of 2009, six years after initial enrollment, by postsecondary program

Initial degree program and field of study	Total attained or persisted	Total, any credential	Certificate	Associate's degree	Bachelor's degree	No credential, still enrolled
Certificate programs						
Career/technical field	60.5 (1.85)	52.7 (1.96)	50.3 (1.98)	1.8 (0.46)	0.7 (0.31)	7.8 (1.14)
Academic field	75.5 (7.82)	54.4 (9.18)	44.8 (8.27)	‡	‡	21.1 (7.27) !
Associate's degree programs						
Career/technical field	54.3 (1.43)	36.9 (1.21)	5.7 (0.63)	19.7 (0.97)	11.5 (0.88)	17.4 (1.22)
Academic field	56.3 (3.48)	37.0 (3.15)	‡	17.1 (1.93)	14.9 (1.93)	19.2 (3.08)
All subbaccalaureate programs	55.9 (0.95)	39.4 (0.82)	15.9 (0.65)	14.5 (0.60)	9.0 (0.51)	16.5 (0.88)
Baccalaureate degree programs	79.0 (0.81)	67.3 (1.02)	1.1 (0.17)	2.9 (0.32)	63.2 (1.09)	11.8 (0.59)
Career field	77.5 (1.01)	64.4 (1.28)	1.3 (0.23)	3.4 (0.45)	59.7 (1.32)	13.1 (0.81)
Academic field	83.6 (1.51)	73.5 (1.92)	1.1 (0.47) !	2.0 (0.47)	70.4 (2.00)	10.1 (1.05)
All beginning students	64.5 (0.65)	49.5 (0.68)	9.4 (0.38)	9.3 (0.37)	30.7 (0.56)	15.0 (0.55)

! Interpret data with caution. Estimate is unstable because the standard error represents more than 30 percent of the estimate.
‡ Reporting standards not met.
NOTE: CTE-focused associate's degrees are distinguished from those with an academic focus per a taxonomy that can be found at http://nces.ed.gov/surveys/ctes/tables/postsec_tax.asp.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2003/04 Beginning Postsecondary Students Longitudinal Study (BPS:2004/09).

Exhibit C.27: Standard Errors for Exhibit 6.9. Percentage of students who began postsecondary education in 2003 who had various employment outcomes in 2009, by postsecondary attainment as of 2009

Credential attained when last enrolled	Employed	Percent of those employed who were working full-time	Consider current job to be start of a career
No degree or certificate	75.2 (1.05)	78.8 (1.13)	44.3 (1.35)
CTE subbaccalaureate credential	81.3 (1.69)	83.2 (1.53)	57.2 (2.22)
Any subbaccalaureate credential	81.3 (1.69)	83.2 (1.53)	57.2 (2.22)
Bachelor's degree	87.5 (0.71)	86.5 (0.75)	65.7 (1.07)

NOTES: Last two columns of table include only those who were employed and not still enrolled in postsecondary education in 2009. Differences between graduates with CTE subbaccalaureate credentials and those with any subbaccalaureate credential were not statistically significant.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Exhibit C.28. Standard Errors for Exhibit 6.10. Average hourly wages earned in 2012 by students who graduated from a public high school in 2004, for secondary CTE concentrators and non-concentrators, by postsecondary attainment

Postsecondary degree or certificate type	All high school graduates	CTE concentrators	Non-concentrators
No postsecondary enrollment	$13.89 (0.43)	$14.54 (0.93)	$13.65 (0.46)
Some postsecondary enrollment, no certificate	$13.81 (0.21)	$14.52 (0.60)	$13.67 (0.22)
Undergraduate certificate	$15.23 (0.48)	$16.27 (1.04)	$14.97 (0.53)
Associate's degree	$16.14 (0.48)	$15.90 (0.76)	$16.18 (0.54)
Bachelor's degree	$18.87 (0.26)	$19.15 (0.67)	$18.84 (0.28)
Professional degree or certificate	$22.94 (0.64)	$22.26 (1.51)	$23.03 (0.70)

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002), Third Follow-up Restricted-use File.

Appendix D. Supplemental Exhibits

Exhibit D.1.
Crosswalk between postsecondary and secondary taxonomies for career and technical education

Postsecondary Career Education Categories	Secondary School Taxonomy CTE Categories
	Family and Consumer Sciences Education
	General Labor Market Preparation
	Occupational Education
Agriculture and Natural Resources	Agriculture and Natural Resources
Business Management	Business Management
	Business Finance
Business Support	Business Support
Communications and Design	Communications and Design
Computer and Information Sciences	Computer and Information Sciences
Consumer Services	Consumer Services
	Culinary Arts
Education	Education
Engineering, Architecture and Science Technologies	Engineering Technologies[1]
	Architecture
Health Sciences	Health Sciences
Marketing	Marketing
Protective Services	Protective Services
Public, Legal, and Social Services	Library Science
	Public Administration
	Legal services
Manufacturing, Construction, Repair, and Transportation	Manufacturing
	Construction
	Repair
	Transportation

[1] In the secondary school taxonomy, engineering courses are included in the academic curriculum rather than the CTE curriculum.
SOURCE: Bradby and Hudson (2007).

Exhibit D.2.
Percentage distribution of undergraduate credentials conferred in CTE fields by Title IV postsecondary institutions, by type of institution, 2011–12

Type of institution	Certificates	Associate's degree	Bachelor's degree
4-year institutions	***8***	***31***	***100***
Public	4	13	63
Private not-for-profit	1	5	30
Private for-profit	3	13	7
2-year institutions	***63***	***69***	†
Public	43	61	†
Private not-for-profit	1	1	†
Private for-profit	19	7	†
Less-than-2-year institutions	***28***	†	†
Public	4	†	†
Private not-for-profit	1	†	†
Private for-profit	23	†	†

† Not applicable.
NOTE: Detail may not sum to totals due to rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics (NCES), Integrated Postsecondary Education Data System (IPEDS). Extracted June 16, 2014, from the IPEDS Data Center, http://www.nces.ed.gov/ipeds/datacenter/.

Exhibit D.3. Supporting detail for Exhibit 2.12.
Change in number of subbaccalaureate CTE awards and other undergraduate awards, selected years from 2000 to 2012

Award	2000	2002	2004	2006	2008	2010	2012
CTE subbaccalaureate awards	897,815	937,797	1,088,776	1,145,877	1,205,307	1,448,742	1,600,678
Certificates	552,321	582,578	687,787	715,401	749,876	935,789	987,715
CTE-focused associate's degrees	345,494	355,219	400,989	430,476	455,431	512,953	612,963
Other undergraduate awards	1,452,235	1,531,374	1,664,061	1,767,972	1,857,536	1,986,633	2,195,621
Academic associate's degrees	216,762	239,741	264,519	282,730	294,838	336,619	404,575
Bachelor's degrees	1,235,473	1,291,633	1,399,542	1,485,242	1,562,698	1,650,014	1,791,046
All undergraduate awards	2,350,050	2,469,171	2,752,837	2,913,849	3,062,843	3,435,375	3,796,299
CTE as a percentage of all undergraduate awards	38.2%	38.0%	39.6%	39.3%	39.4%	42.2%	42.2%
Certificates as a percentage of all CTE subbaccalaureate awards	61.5%	62.1%	63.2%	62.4%	62.2%	64.6%	61.7%

SOURCE: U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), selected years from 2000 to 2012.

Exhibit D.4. Supporting detail for Exhibit 2.13. Change in number of subbaccalaureate CTE certificates and associate's degrees awarded, by career field of study, 2002 to 2012

CTE occupational field	2002	2012	Change	% Change
Associate's degrees and certificates	922,869	1,547,045	624,176	68
Health sciences	268,413	635,327	366,914	137
Protective services	37,566	80,283	42,717	114
Education	14,069	28,888	14,819	105
Consumer services	108,080	190,632	82,552	76
Manufacturing, construction, repair, and transportation	113,537	196,613	83,076	73
Public, legal, and social services	18,467	31,405	12,938	70
Business management	102,177	149,097	46,920	46
Communications and design	32,004	36,283	4,279	13
Engineering, architecture, and science technologies	72,481	77,593	5,112	7
Agriculture and natural resources	12,909	12,843	–66	–1
Computer and information sciences	85,180	67,417	–17,763	–21
Business support	38,950	30,051	–8,899	–23
Marketing	19,036	10,613	–8,423	–44
Associate's degrees	355,219	612,963	257,744	73
Protective services	16,689	50,695	34,006	204
Health sciences	82,408	218,041	135,633	165
Education	9,611	20,531	10,920	114
Public, legal, and social services	11,667	22,323	10,656	91
Manufacturing, construction, repair, and transportation	18,371	32,216	13,845	75
Consumer services	19,007	32,660	13,653	72
Business management	68,089	106,664	38,575	57
Communications and design	20,695	22,654	1,959	9
Agriculture and natural resources	6,494	7,066	572	9
Computer and information sciences	40,145	41,161	1,016	3
Engineering, architecture, and science technologies	43,375	43,644	269	1
Marketing	7,148	6,358	–790	–11
Business support	11,520	8,950	–2,570	–22
Certificates	567,650	934,082	366,432	65
Health sciences	186,005	417,286	231,281	124
Education	4,458	8,357	3,899	87
Consumer services	89,073	157,972	68,899	77
Manufacturing, construction, repair, and transportation	95,166	164,397	69,231	73
Protective services	20,877	29,588	8,711	42
Public, legal, and social services	6,800	9,082	2,282	34
Business management	34,088	42,433	8,345	24
Communications and design	11,309	13,629	2,320	21
Engineering, architecture, and science technologies	29,106	33,949	4,843	17
Agriculture and natural resources	6,415	5,777	–638	–10
Business support	27,430	21,101	–6,329	–23
Computer and information sciences	45,035	26,256	–18,779	–42
Marketing	11,888	4,255	–7,633	–64

SOURCE: U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), 2002 and 2012.

Exhibit D.5. Supporting detail for Exhibit 3.1. Federal appropriations for career and technical education, from FY 1985 through FY 2014, in nominal dollars (actual appropriations) and in constant 2014 dollars

Fiscal year	Actual appropriations	Constant FY 2014 dollars	GDP deflator
1985	842,148,000	1,642,597,410	0.5127
1986	813,113,000	1,550,097,122	0.5246
1987	881,967,000	1,637,589,374	0.5386
1988	888,243,000	1,598,041,959	0.5558
1989	918,404,000	1,590,580,721	0.5774
1990	936,723,000	1,564,753,193	0.5986
1991	1,008,488,000	1,623,005,921	0.6214
1992	1,152,848,000	1,808,253,714	0.6375
1993	1,173,727,000	1,801,388,497	0.6516
1994	1,180,477,000	1,774,248,100	0.6653
1995	1,107,847,000	1,630,523,533	0.6794
1996	1,084,896,000	1,566,523,285	0.6926
1997	1,136,195,000	1,610,879,150	0.7053
1998	1,144,047,000	1,601,665,800	0.7143
1999	1,150,147,000	1,589,164,596	0.7237
2000	1,188,150,000	1,609,751,613	0.7381
2001	1,237,500,000	1,638,131,452	0.7554
2002	1,314,500,000	1,711,675,813	0.7680
2003	1,325,826,000	1,691,880,860	0.7836
2004	1,327,846,000	1,652,643,850	0.8035
2005	1,326,107,000	1,598,489,378	0.8296
2006	1,296,306,000	1,511,186,898	0.8578
2007	1,296,306,000	1,467,750,566	0.8832
2008	1,271,694,000	1,407,233,955	0.9037
2009	1,271,694,000	1,389,377,275	0.9153
2010	1,271,694,000	1,375,414,937	0.9246
2011	1,131,503,000	1,198,623,531	0.9440
2012	1,130,859,000	1,176,335,380	0.9613
2013	1,071,866,000	1,092,161,688	0.9814
2014	1,117,598,000	1,117,598,000	1.0000

SOURCES: U.S. Department of Education, Budget History Table, http://www2.ed.gov/about/overview/budget/history/edhistory.pdf (accessed June 19, 2014). GDP deflator used for constant dollar calculations is from Bureau of Labor Statistics, Inflation Calculator, http://data.bls.gov/cgi-bin/cpicalc.pl (accessed June 19, 2014).

Exhibit D.6. Supporting detail for Exhibit 3.2. Federal appropriations for Career and Technical Education compared with total discretionary funding for elementary-secondary and postsecondary education programs, for selected fiscal years from FY 1985 through FY 2014, in nominal dollars (actual appropriations) and in constant 2014 dollars

Fiscal year	Career and technical education	Elementary and secondary programs	Postsecondary programs
Nominal dollars (actual appropriations)			
FY 1985	842,148,000	7,551,707,000	5,889,095,000
FY 1991	1,008,488,000	12,348,715,000	7,824,855,000
FY 2000	1,188,150,000	22,600,399,000	11,270,671,000
FY 2007	1,296,306,000	36,830,689,000	17,052,433,000
FY 2014	1,117,598,000	37,225,602,000	26,778,138,000
Constant FY 2014 dollars			
FY 1985	1,642,597,410	14,729,494,527	11,486,594,034
FY 1991	1,623,005,921	19,873,352,551	12,592,897,486
FY 2000	1,609,751,613	30,619,895,419	15,269,941,355
FY 2007	1,467,750,566	41,701,777,682	19,307,723,782
FY 2014	1,117,598,000	37,225,602,000	26,778,138,000

NOTES: The first four years presented in this exhibit represent the first appropriations year after the passage of *Perkins I* through *Perkins IV*. Specific programs that received federal appropriations varied by year.
SOURCE: U.S. Department of Education, Budget History Table, http://www2.ed.gov/about/overview/budget/history/index.html (accessed June 19, 2014). GDP deflator used for constant dollar calculations is from Bureau of Labor Statistics, Inflation Calculator, http://data.bls.gov/cgi-bin/cpicalc.pl (accessed June 19, 2014).

Exhibit D.7. Supporting detail for Exhibit 3.4. Total *Perkins* state grants (Title I and Title II), in FY 2000, FY 2007, and FY 2014, in nominal dollars and in constant 2014 dollars, by state

State	FY 2000 (nominal $)	FY 2007 (nominal $)	FY 2014 (nominal $)	FY 2000 (constant $)	FY 2007 (constant $)	FY 2014 (constant $)
Alabama	21,443,360	21,769,992	19,175,065	29,052,294	24,649,209	19,175,065
Alaska	4,588,329	4,575,779	4,214,921	6,216,446	5,180,954	4,214,921
Arizona	21,328,686	27,027,130	24,934,607	28,896,929	30,601,637	24,934,607
Arkansas	12,848,961	13,743,109	11,403,795	17,408,270	15,560,721	11,403,795
California	124,898,916	140,775,071	122,943,598	169,217,886	159,393,453	122,943,598
Colorado	15,185,685	17,259,809	15,944,320	20,574,154	19,542,527	15,944,320
Connecticut	9,419,747	11,143,711	9,466,507	12,762,238	12,617,536	9,466,507
Delaware	4,719,758	5,356,929	4,720,975	6,394,511	6,065,416	4,720,975
District of Columbia	4,518,171	4,524,230	4,214,921	6,121,393	5,122,588	4,214,921
Florida	55,176,055	69,438,267	61,726,876	74,754,655	78,621,912	61,726,876
Georgia	33,162,739	41,049,557	38,240,445	44,930,163	46,478,617	38,240,445
Hawaii	5,718,520	6,335,233	5,496,906	7,747,672	7,173,107	5,496,906
Idaho	6,978,400	7,479,215	6,376,981	9,454,606	8,468,388	6,376,981
Illinois	43,753,081	49,165,761	40,519,069	59,278,368	55,668,240	40,519,069
Indiana	26,492,515	28,335,259	24,843,250	35,893,085	32,082,774	24,843,250
Iowa	13,293,398	13,394,907	11,963,946	18,010,410	15,166,467	11,963,946
Kansas	11,944,943	12,401,918	10,245,408	16,183,471	14,042,149	10,245,408
Kentucky	19,817,664	19,924,585	17,905,647	26,849,738	22,559,736	17,905,647
Louisiana	23,611,104	23,835,263	21,041,943	31,989,238	26,987,625	21,041,943
Maine	5,718,520	6,337,374	5,496,906	7,747,672	7,175,531	5,496,906
Maryland	16,743,299	18,458,868	15,289,772	22,684,470	20,900,169	15,289,772
Massachusetts	18,987,355	20,042,184	17,766,415	25,724,804	22,692,888	17,766,415
Michigan	40,712,376	43,440,125	37,280,167	55,158,703	49,185,353	37,280,167
Minnesota	18,937,971	19,911,262	16,684,637	25,657,896	22,544,651	16,684,637
Mississippi	14,950,135	15,193,564	13,363,550	20,255,022	17,203,008	13,363,550
Missouri	23,976,218	26,080,910	21,433,742	32,483,908	29,530,273	21,433,742
Montana	5,571,046	6,049,439	5,179,103	7,547,869	6,849,515	5,179,103
Nebraska	7,691,824	7,790,955	6,816,893	10,421,181	8,821,357	6,816,893
Nevada	6,241,480	9,091,529	9,650,599	8,456,199	10,293,941	9,650,599
New Hampshire	5,718,520	6,335,233	5,496,906	7,747,672	7,173,107	5,496,906
New Jersey	23,844,093	27,223,513	22,370,715	32,304,900	30,823,993	22,370,715
New Mexico	9,130,551	10,134,704	8,028,679	12,370,424	11,475,082	8,028,679
New York	56,608,306	64,847,401	51,368,505	76,695,124	73,423,875	51,368,505
North Carolina	32,138,606	38,212,653	35,695,795	43,542,627	43,266,515	35,695,795
North Dakota	4,585,663	4,553,451	4,214,921	6,212,834	5,155,673	4,214,921
Ohio	47,921,570	50,157,342	42,750,001	64,925,998	56,790,964	42,750,001
Oklahoma	17,372,954	17,280,808	15,094,180	23,537,551	19,566,303	15,094,180
Oregon	14,112,005	15,679,241	13,448,245	19,119,491	17,752,919	13,448,245
Pennsylvania	45,404,884	49,737,845	40,722,778	61,516,294	56,315,986	40,722,778
Rhode Island	5,718,520	6,335,233	5,496,906	7,747,672	7,173,107	5,496,906
South Carolina	18,938,437	20,681,285	18,310,739	25,658,528	23,416,514	18,310,739
South Dakota	4,637,876	4,829,157	4,214,921	6,283,574	5,467,843	4,214,921
Tennessee	24,066,027	26,265,904	23,042,024	32,605,585	29,739,734	23,042,024
Texas	90,736,300	103,826,774	92,014,058	122,933,052	117,558,513	92,014,058
Utah	13,404,486	13,852,834	12,274,340	18,160,917	15,684,958	12,274,340
Vermont	4,570,015	4,556,775	4,214,921	6,191,633	5,159,437	4,214,921
Virginia	26,132,675	28,352,346	23,634,248	35,405,560	32,102,121	23,634,248
Washington	22,287,683	25,116,932	20,736,066	30,196,216	28,438,803	20,736,066
West Virginia	9,305,887	9,305,887	8,428,617	12,607,976	10,536,649	8,428,617
Wisconsin	23,129,736	24,210,360	20,241,685	31,337,062	27,412,331	20,241,685
Wyoming	4,500,805	4,491,858	4,214,921	6,097,865	5,085,934	4,214,921

SOURCE: U.S. Department of Education, State Funding History Tables, http://www2.ed.gov/about/overview/budget/history/index.html (accessed June 19, 2014). GDP deflator used for constant dollar calculations is from Bureau of Labor Statistics, Inflation Calculator, http://data.bls.gov/cgi-bin/cpicalc.pl (accessed June 19, 2014).

Exhibit D.8.
Amount and percentage of state *Perkins* Title I and Title II funds allocated to administration and amount and percentage of state matching contribution, by state, FY 2010

State	Total Title I and II funds	Amount reserved for state administration	Percentage of *Perkins* allocation	State match	Percentage of *Perkins* allocation
Total	1,223,877,450	51,866,549	4.2	299,762,557	24.5
Alabama	21,169,358	1,028,468	4.9	1,028,468	4.9
Alaska	4,465,084	250,000	5.6	250,000	5.6
Arizona	26,950,635	1,253,518	4.7	2,358,900	8.8
Arkansas	12,905,743	645,287	5.0	1,000,000	7.7
California	139,243,327	6,399,575	4.6	6,399,575	4.6
Colorado	17,242,558	792,447	4.6	792,447	4.6
Connecticut	10,831,245	541,562	5.0	51,189,507	472.6
Delaware	5,052,516	250,000	4.9	71,000,000	1,405.2
District of Columbia	4,349,598	250,000	5.7	250,000	5.7
Florida	64,193,572	1,350,000	2.1	1,350,000	2.1
Georgia	41,807,825	2,090,390	5.0	2,090,390	5.0
Hawaii	6,121,451	306,073	5.0	523,137	8.5
Idaho	7,006,710	350,335	5.0	N/A	N/A
Illinois	49,157,223	2,255,395	4.6	2,255,395	4.6
Indiana	28,052,743	494,923	1.8	494,923	1.8
Iowa	13,208,250	598,197	4.5	598,197	4.5
Kansas	11,721,389	586,069	5.0	586,069	5.0
Kentucky	19,767,916	988,396	5.0	2,167,818	11.0
Louisiana	23,230,400	1,161,520	5.0	1,161,520	5.0
Maine	6,235,453	311,773	5.0	311,773	5.0
Maryland	18,424,911	921,246	5.0	921,246	5.0
Massachusetts	20,565,053	600,000	2.9	600,000	2.9
Michigan	44,594,721	2,047,648	4.6	2,047,648	4.6
Minnesota	19,395,706	969,785	5.0	969,785	5.0
Mississippi	14,753,419	668,178	4.5	668,178	4.5
Missouri	24,871,527	1,134,685	4.6	1,667,627	6.7
Montana	5,825,871	269,892	4.6	285,091	4.9
Nebraska	7,525,881	376,294	5.0	376,294	5.0
Nevada	8,609,174	430,458	5.0	488,233	5.7
New Hampshire	6,086,100	304,305	5.0	285,498	4.7
New Jersey	26,071,027	1,303,551	5.0	1,303,551	5.0
New Mexico	9,279,588	422,287	4.6	422,287	4.6
New York	66,954,138	1,400,000	2.1	1,400,000	2.1
North Carolina	38,904,958	1,795,580	4.6	1,800,000	4.6
North Dakota	4,528,072	250,000	5.5	2,100,000	46.4
Ohio	49,171,479	2,233,195	4.5	2,233,195	4.5
Oklahoma	16,664,042	754,709	4.5	754,709	4.5
Oregon	15,361,296	768,064	5.0	768,064	5.0
Pennsylvania	49,131,116	2,244,788	4.6	2,244,788	4.6
Rhode Island	6,048,484	285,497	4.7	437,252	7.2
South Carolina	20,567,894	956,407	4.6	956,407	4.6
South Dakota	4,697,519	250,000	5.3	561,852	12.0
Tennessee	25,366,106	1,268,305	5.0	1,268,305	5.0
Texas	101,081,082	3,290,344	3.3	3,290,344	3.3
Utah	14,197,655	709,882	5.0	1,539,536	10.8
Vermont	4,452,109	250,000	5.6	282,668	6.3
Virginia	27,720,438	1,265,133	4.6	1,669,645	6.0
Washington	23,061,524	1,051,234	4.6	1,051,234	4.6
West Virginia	9,305,231	421,431	4.5	1,203,000	12.9
Wisconsin	23,499,683	1,069,723	4.6	119,915,408	510.3
Wyoming	4,448,650	250,000	5.6	442,593	9.9

N/A indicates data are not available.
SOURCE: *Perkins* Consolidated Annual Reports, FY 2010 (*n* = 51).

Exhibit D.9. Supporting detail for Exhibit 3.6. Percentage of *Perkins* Title I formula-allocated funds that states allocated to secondary and postsecondary education, by state, FY 2001 and FY 2010

State	Secondary		Postsecondary		Percentage point change in secondary share
	FY 2001	FY 2010	FY 2001	FY 2010	
Alabama	63	68	37	32	5
Alaska	87	85	13	15	–2
Arizona	86	84	14	16	–1
Arkansas	75	74	25	26	–1
California	41	38	59	62	–4
Colorado	42	40	58	60	–2
Connecticut	86	81	14	19	–5
Delaware	N/A	85	N/A	15	N/A
District of Columbia	N/A	81	N/A	19	N/A
Florida	53	51	47	49	–3
Georgia	49	50	51	50	1
Hawaii	50	50	50	50	0
Idaho	65	65	35	35	0
Illinois	60	60	40	40	0
Indiana	N/A	64	N/A	36	N/A
Iowa	56	51	44	49	–6
Kansas	56	50	45	50	–6
Kentucky	49	55	51	45	6
Louisiana	55	56	45	44	1
Maine	50	50	50	50	0
Maryland	65	65	35	35	0
Massachusetts	71	70	29	30	–1
Michigan	N/A	60	N/A	40	N/A
Minnesota	36	42	64	58	6
Mississippi	53	53	48	47	1
Missouri	71	72	30	28	2
Montana	63	65	37	35	2
Nebraska	60	55	40	45	–5
Nevada	68	68	32	32	0
New Hampshire	79	80	21	21	0
New Jersey	66	55	34	45	–11
New Mexico	36	50	64	50	14
New York	57	52	43	48	–5
North Carolina	N/A	64	N/A	36	N/A
North Dakota	65	65	35	35	0
Ohio	82	88	18	12	6
Oklahoma	88	84	12	16	–4
Oregon	N/A	50	N/A	50	NA
Pennsylvania	70	70	30	30	0
Rhode Island	N/A	85	N/A	15	N/A
South Carolina	82	67	18	33	–15
South Dakota	43	50	57	50	7
Tennessee	89	85	11	15	–4
Texas	57	71	43	30	13
Utah	58	60	42	40	2
Vermont	80	75	20	25	–5
Virginia	85	85	15	15	0
Washington	43	44	57	56	1
West Virginia	78	71	22	29	–7
Wisconsin	44	48	56	52	3
Wyoming	65	60	35	40	–5

N/A indicates data are not available.
SOURCE: Silverberg et al. (2004) (*n* = 44); *Perkins* Consolidated Annual Reports, FY 2010 (*n* = 51).

Exhibit D.10. Supporting detail for Exhibit 3.13. Number of waivers granted by each state that used the minimum allocation rule waiver at the secondary level, 2008–09

State	Sparsely populated areas	Public charter schools	Reason not specified
Arizona	12	7	1
California	21	5	0
Colorado	21	0	1
Florida	1	0	0
Georgia	6	0	0
Idaho	2	0	0
Kentucky	15	0	0
Maine	1	0	0
Massachusetts	1	0	0
Mississippi	3	0	3
Montana	152	0	0
Nevada	7	0	0
North Carolina	4	0	0
North Dakota	4	0	0
South Carolina	7	0	0
South Dakota	2	0	0
Tennessee	1	0	0
Utah	4	0	0
Virginia	5	0	0
Total	269	12	5

NOTE: In addition to the 19 states shown above, Washington, Wyoming, and Puerto Rico reported that they granted waivers of the minimum allocation rule but did not indicate the number of waivers granted or the reason for granting such waivers.
SOURCE: NACTE Survey of Secondary State Directors, 2009 (*n* = 50).

Exhibit D.11.
Perkins IV core indicators for secondary education and the numerators and denominators that are recommended in the Department's nonregulatory guidance for calculating each indicator

Core indicator	Numerator	Denominator
Academic attainment — reading/ language arts and mathematics	Number of CTE concentrators who met the proficient or advanced level on statewide *ESEA* high school assessments, based on the scores that were included in the state's computation of adequate yearly progress, and who, in the reporting year, left secondary education.	Number of CTE concentrators who took the *ESEA* assessments whose scores were included in the state's computation of adequate yearly progress, and who, in the reporting year, left secondary education.
Technical skill attainment	Number of CTE concentrators who passed technical skill assessments that are aligned with industry-recognized standards, if available and appropriate, during the reporting year.	Number of CTE concentrators who took the assessments during the reporting year.
Completion	Number of CTE concentrators who earned a regular secondary school diploma, earned a GED credential as a State-recognized equivalent to a regular high school diploma or other State-recognized equivalent (including recognized alternative standards for individuals with disabilities), or earned a proficiency credential, certificate, or degree, in conjunction with a secondary school diploma, during the reporting year.	Number of CTE concentrators who left secondary education during the reporting year.
Graduation rate	Number of CTE concentrators who, in the reporting year, were included as graduated in the State's computation of its graduation rate as described in Section 1111(b)(2)(C)(vi) of the *ESEA*.	Number of CTE concentrators who, in the reporting year, were included in the State's computation of its graduation rate as defined in the State's Consolidated Accountability Plan pursuant to Section 1111(b)(2)(C)(vi) of the *ESEA*.
Placement	Number of CTE concentrators who left secondary education and were placed in postsecondary education or advanced training, in the military service, or employment in the second quarter following the program year in which they left secondary education.	Number of CTE concentrators who left secondary education during the reporting year.
Nontraditional participation	Number of CTE participants from underrepresented gender groups who participated in a program that leads to employment in nontraditional fields during the reporting year.	Number of CTE participants who participated in a program that leads to employment in nontraditional fields during the reporting year.
Nontraditional completion	Number of CTE concentrators from underrepresented gender groups who completed a program that leads to employment in nontraditional fields during the reporting year.	Number of CTE concentrators who completed a program that leads to employment in nontraditional fields during the reporting year.

SOURCE: Justesen (2007).

Exhibit D.12.
Perkins IV core indicators for postsecondary education and the numerators and denominators that are recommended in the Department's nonregulatory guidance for calculating each indicator

Core indicator	Numerator	Denominator
Technical skill attainment	Number of CTE concentrators who passed technical skill assessments that are aligned with industry-recognized standards, if available and appropriate, during the reporting year.	Number of CTE concentrators who took technical skill assessments during the reporting year.
Completion	Number of CTE concentrators who received an industry-recognized credential, a certificate, or a degree during the reporting year.	Number of CTE concentrators who left postsecondary education during the reporting year.
Retention or transfer	Number of CTE concentrators who remained enrolled in their original postsecondary institution or transferred to another 2-year or 4-year postsecondary institution during the reporting year and who were enrolled in postsecondary education in the fall of the previous reporting year.	Number of CTE concentrators who were enrolled in postsecondary education in the fall of the previous reporting year and who did not earn an industry-recognized credential, a certificate, or a degree in the previous reporting year.
Placement	Number of CTE concentrators who were placed or retained in employment, or placed in military service or apprenticeship programs in the second quarter following the program year in which they left postsecondary education.	Number of CTE concentrators who left postsecondary education during the reporting year.
Nontraditional participation	Number of CTE participants from underrepresented gender groups who participated in a program that leads to employment in nontraditional fields during the reporting year.	Number of CTE participants who participated in a program that leads to employment in nontraditional fields during the reporting year.
Nontraditional completion	Number of CTE concentrators from underrepresented gender groups who completed a program that leads to employment in nontraditional fields during the reporting year.	Number of CTE concentrators who completed a program that leads to employment in nontraditional fields during the reporting year.

SOURCE: Justesen (2007).

Exhibit D.13.
Proficiency rates on state high school English/language arts assessments for CTE concentrators as reported under *Perkins* and for all students as reported under *ESEA*, by state, 2011–12

State	*Perkins* reporting	*ESEA* reporting	Percentage point difference
Wisconsin	78	42	36
Colorado	93	69	24
Alabama	100	83	17
Arizona	96	80	16
Florida	66	51	15
District of Columbia	56	43	13
North Dakota	77	66	11
Connecticut	91	80	11
Oregon	94	84	10
Kentucky	61	52	9
New Mexico	54	46	8
Rhode Island	85	77	8
Ohio	95	87	8
Idaho	96	88	8
Oklahoma	83	75	8
Texas	97	90	7
Nevada	84	77	7
Hawaii	77	70	7
Tennessee	68	61	7
Nebraska	70	64	6
Virginia	99	94	5
Georgia	93	89	4
New York	96	93	3
Kansas	91	88	3
Wyoming	79	76	3
New Jersey	93	91	2
Maryland	85	83	2
Mississippi	58	57	1
Minnesota	78	77	1
Alaska	82	81	1
Washington	84	83	1
Illinois	51	51	0
Missouri	72	73	–1
Utah	87	89	–2
California	53	56	–3
Montana	80	84	–4
South Dakota	66	70	–4
Delaware	67	72	–5
Michigan	52	57	–5
Arkansas	63	69	–6
Iowa	77	83	–6
New Hampshire	67	77	–10
West Virginia	31	45	–14
Massachusetts	72	88	–16
Indiana	62	78	–16
Pennsylvania	48	66	–18
Vermont	54	72	–18
Maine	29	47	–18
Louisiana	66	90	–24
North Carolina	55	86	–31
South Carolina	58	89	–31

SOURCE: Perkins Consolidated Annual Reports (*n* = 51); *ESEA* Consolidated State Performance Reports (*n* = 51).

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