Office of the Washington State Auditor
Pat McCarthy

Performance Audit

Leading Practices for the State's Secondary Career and Technical Education Programs

December 19, 2017

Students can shorten the path to a good job after graduating from high school by taking career and technical education (CTE) courses that align with courses offered at community and technical colleges or through apprenticeships. However, this performance audit found that many high school students are not given the information or courses necessary to take advantage of these options.

The three lead agencies that deliver, oversee and operate Washington's CTE programs do so with little coordination and are guided by statutes that lack clarity. The lack of coordination extends to school districts and colleges, making a student's secondary-to-postsecondary transition more difficult. Implementing the leading practices identified in this report will be challenging for these three agencies, as each has its own leadership, mission and funding, but lacks the statutory authority to require cooperation.

This report makes recommendations to the Legislature, the Office of Superintendent of Public Instruction, the Workforce Training and Education Coordinating Board, and the State Board for Community and Technical Colleges. Recommended actions include clarifying statutes and improving coordination, oversight and cooperation across Washington's career and technical education system. These recommendations should help improve career guidance for students, increase dual credit opportunities for college courses taken in high school, smooth secondary to postsecondary transitions and strengthen engagement with the state's business community.

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Executive Summary

While some high school students pursue a bachelor's degree after graduation, others are looking for good jobs that do not require four years of college or university education. Many mid-level-skill jobs pay well and require no more than two years of education from a community or technical college. Students can shorten that time by taking college-level career and technical education (CTE) courses while in high school. Opportunities also exist for some CTE students to enter into apprenticeships or other mid-level jobs right out of high school. However, Washington employers report being unable to fill many of their mid-level-skill openings.

The audit found that CTE courses offered in Washington's public schools with the highest enrollment could more strongly align with high-wage, high-demand occupational areas. It identifies four areas for improvement. If Washington adopts leading practices in these four areas, the state could create more opportunities for students while closing the gap between students' skills and employers' needs.

1. Improve career guidance given to students, and provide it in a classroom setting in the 7th or 8th grade

Introducing students to the many careers and jobs available after high school could help them choose occupations that pay well but may not require a four-year degree. Paths to such careers include taking courses in high school that align to CTE courses in colleges or apprenticeships. The Office of Superintendent of Public Instruction (OSPI) and district CTE officials said many students and their parents are unaware of the options available to them, which can become a problem when students try to develop their High School and Beyond Plan.

While recent legislation requires an inventory of each student's career interests and skills in the 7th or 8th grade, more could be done to address this lack of awareness. According to educational research, a major reason that students drop out of high school is they cannot see the connection between their high school courses and a job. Helping students explore the many career options that are available to them in a comprehensive way in the 7th or 8th grade is a recommended practice incorporated in career-focused educational models to address this problem.

2. Strengthen employer engagement to better align CTE programs and courses with high-wage industry-needed skills

Businesses report difficulty finding job candidates with the technical skills they need. More coordinated outreach through CTE advisory committees would strengthen school districts' ability to incorporate the skills employers need into coursework. The CTE courses schools currently offer do not always reflect the skills and trades most in demand.

To prepare students for the postsecondary world of education and work, the Workforce Board, OSPI and the State Board for Community and Technical Colleges (SBCTC) can do more to ensure that schools and colleges strengthen their engagement with employers. Establishing a systematic approach to engagement could achieve three benefits: better aligning industry expectations across college and district CTE curricula; reducing some of the duplicative effort employers expend by serving on multiple committees; and allowing regional employers to reach a wider group of schools and colleges.

3. Update the list of high-demand programs, strengthen the review of local labor demand data and clarify laws to help reduce the skills gap

OSPI currently lacks an updated list of statewide high-demand programs. State law requires OSPI to work with the Workforce Board, SBCTC and the Washington State Apprenticeship and Training Council to develop this list to help inform school districts about what types of programs are needed. When districts want to propose additional CTE programs, state law requires them to submit evidence of local high demand to OSPI when seeking approval for those programs. To ensure that each district's CTE programs help address the state's skills gap, OSPI reviews this evidence before approving the district's CTE plans.

OSPI could strengthen the approval process for new and existing programs if it consistently reviewed actual labor market data or analysis that is sufficient to demonstrate high demand. Collecting and reviewing this type of evidence for all CTE programs and having the Legislature define key terms in the state's CTE statutes would help OSPI to better assess whether district CTE programs are helping to address the skills gap.

4. Expand the number of CTE dual-credit opportunities to increase the number of pathways from high school to college

Students can take CTE courses in high school that align with similar courses in college programs, allowing them to gain "dual credit" at the college. This dual credit is typically achieved through articulation agreements between one high school and one college. While all colleges are required to give equivalent credit, some may only award the credit as an elective. Articulated CTE courses offered and transcripted by one college might not be accepted towards the same CTE program at another college. This could lead to students having to retake courses when they enter or transfer to other colleges. Additionally, the content and the number of these agreements between school districts and colleges can vary significantly across the state because they are managed and negotiated between the faculty of individual colleges and high schools – a time-consuming and costly process.

SBCTC maintains a database containing most existing agreements, but there is little funding available to expand them. In addition, the state as a whole lacks a mechanism to develop statewide agreements for CTE that could serve many districts and colleges more efficiently. A statewide approach to articulation could increase the number of dual-credit opportunities for students and reduce administrative costs to school districts and colleges.

A stronger, more coordinated CTE system could improve student outcomes

The agencies that deliver, oversee and operate Washington's CTE programs do so with little coordination. This lack of coordination extends to school districts and colleges, making a student's secondary-to-postsecondary transition more difficult. Implementing the leading practices identified in this report is challenging when multiple agencies work together. This coordination is more difficult because no agency has the statutory authority to require other agencies to cooperate or hold them accountable.

Industry sources recognize it is a leading practice to coordinate a state's secondary and postsecondary CTE programs. Greater coordination should be supported by legislation that helps the two systems undertake the task of engaging with large or regional businesses to improve the connection between employer needs and student learning, as well as leading the process of establishing statewide articulation agreements for CTE courses that are common across the college system and are easily tied to industry standards.

Consequently, we make recommendations to the Legislature, OSPI, Workforce Board and SBCTC that will clarify statutes and improve coordination, oversight and cooperation across Washington's career and technical education system. These recommendations should help improve career guidance for students, increase dual credit opportunities for college courses taken in high school, smooth secondary to postsecondary transitions and strengthen engagement with the state's business community.

Recommendations

We recommend the Legislature:

1. Require the Office of Superintendent of Public Instruction (OSPI) to work with the State Board of Education to establish a model course framework required for all students in the 7th or 8th grade that:
   a) Teaches students about multiple career paths that include postsecondary career and technical education (CTE), apprenticeships, military and four-year professional opportunities along with the educational costs and anticipated incomes that accompany each
   b) Informs students about dual-credit opportunities that exist within CTE programs
   c) Includes the development of students' High School and Beyond plans
   d) Incorporates the improved Career Bridge website or other comprehensive career guidance tools
2. Require the Workforce Board to establish a workgroup that is funded by the Legislature and consists of staff from the Workforce Board, OSPI and the State Board for Community and Technical Colleges (SBCTC). This workgroup should be responsible for establishing:
   a) A complete inventory of all active articulation agreements maintained in a centralized database, which must be used by all districts and colleges
   b) A list of all CTE programs across districts and colleges to help identify articulation opportunities
   c) Statewide articulation agreements for those courses offering a good return on investment that incorporate common course numbering and lead to dual credit for use by all school districts and colleges
   d) Standards identifying key elements required for all unique and statewide articulation agreements
   e) A structured process to increase regional coordination of secondary and postsecondary advisory committees to more effectively and efficiently engage employers
   f) A method to coordinate data sharing and analysis using:
      - Employment Security Department data on occupational wages and growth forecasts
      - Biennial business surveys conducted by the Workforce Board

- Labor-market demand data collected by colleges and SBCTC that drives postsecondary CTE programs and courses

3. Once established, require the workgroup to:
   a) Define how to prioritize the establishment of new statewide articulation agreements. These agreements should:
      - Be implemented through a deliberative process between faculty in school districts and colleges
      - Begin with the most common CTE courses, including those with curricula that can be easily tied to nationally recognized industry standards
      - Incorporate curricula that are established in partnership with the Centers of Excellence and businesses where applicable
      - Require reviews at least once every three years to update the curricula
   b) Develop and report performance measures to the Legislature that show:
      - The increase in the number of CTE college paths (articulated dual credit courses multiplied by the number of colleges that accept them)
      - Cost savings achieved across the secondary and postsecondary systems
4. Revise RCW Chapter 28A.700 to:
   a) Define the term "skills gap", as used in RCW 28A.700.010 (2)(a), which requires districts to demonstrate how their CTE plans helps address the skills gap. Clarifying this term would potentially affect how and the extent by which high-demand occupations drives CTE programming. This new definition should apply consistently across agencies.
   b) Define the term "high wage" as used in the definition of CTE (RCW 28A.700.010 (5)), which in part defines CTE as "a planned program of courses that enable options for students to obtain high-wage employment preparation." This new definition should apply consistently across agencies.
   c) Require districts to submit evidence of high local labor demand for existing CTE programs when OSPI reapproves them every five years

We recommend the Office of Superintendent of Public Instruction:

5. Communicate to school counselors annually the importance of discussing CTE and apprenticeship paths along with academic paths as part of each student's High School and Beyond Plan
6. Consistent with state law, work with the Workforce Board, Washington State Apprenticeship and Training Council, and SBCTC to establish a regularly updated list of high-demand CTE programs using the occupational demand data provided by Workforce Board
7. Consistent with state law, strengthen procedures and documentation requirements to assess whether CTE programs that districts propose or renew correspond with local high demand

We recommend the Workforce Board:

8. Gather input from OSPI and the State Board of Education to enhance the Career Bridge website. This website should include information about CTE and dual-credit opportunities in high school.

We recommend the State Board for Community and Technical Colleges:

9. Share with OSPI and the Workforce Board the labor market data and analysis that colleges and SBCTC consider when developing postsecondary CTE programs and courses

Introduction

Every year, about 60,000 Washington high school students graduate. While many graduates plan to attend a four-year college, others seek good jobs that do not require a bachelor's degree. Many of these jobs require at least some level of postsecondary education at a community or technical college. Nonetheless, employers report being unable to fill many of these jobs, which contributes to a skills gap.

Career and technical education (CTE) courses in high school can lead to certificates, apprenticeships or two-year college degrees that help prepare students for these opportunities at a much lower cost than a four-year degree. Obtaining a certificate or a degree at a community or technical college is almost always less expensive than completing a university degree. For the 2016-2017 school year, annual tuition and fees for an in-state community and technical college cost about $4,000; four-year public universities ranged from $6,000 to $10,000. Most private universities topped $40,000 a year.

Washington spends about $450 million annually on CTE programs in middle and high schools. The Office of Superintendent of Public Instruction (OSPI) and individual school districts administer these CTE programs and are responsible for making sure students and parents know enough about the benefits of CTE programs to take advantage of them.

According to leading practices, one measure of CTE program effectiveness is how well CTE students are prepared for high-paying, high-demand or stable-demand occupations. Another is how easily employers can find employees with the skills they need. Communication between educators and the business community is critical for CTE programs to effectively meet the business community's needs.

The State Auditor's 2015 performance audit of Washington's workforce development system identified three risks to the system, which are examined in greater depth in this audit. Risks include inconsistencies in the:

- Quality of counseling intended to help students transfer into training and employment
- Way schools offer career and technical education courses to students
- Degree of engagement between employers and educators

Each inconsistency can pose challenges that the state must overcome if both students and businesses are to achieve their desired outcomes: good jobs and skilled employees. If the state fails, the result is a gap between what students learn and what employers need.

This audit is the second in a series focusing on CTE. The first, published in December 2016, examined CTE outcomes by studying the state's 2012 and 2013 graduating classes. The audit found that CTE and non-CTE students had similar overall rates of employment and educational outcomes after graduating from high school. However, of those who did not enroll in any type of college or four-year university, CTE students had significantly higher employment, including apprenticeships, than non-CTE students. The recommendations in this report can help CTE programs reach and benefit more students in a manner that is more efficient for the state's school districts and colleges.

This audit seeks to answer these questions:

- Are secondary CTE programs and courses aligned with the needs of students and employers?
- Are there leading practices that could improve the success of the state's secondary CTE programs?

Background

The Carl D. Perkins Career and Technical Education Act and how it shaped CTE in Washington

Nationally, and in Washington, CTE has been influenced and shaped by the federal Carl D. Perkins Career and Technical Education Act (Perkins Act), which was originally authorized by Congress in 1984. The Act was intended to strengthen and expand the economic base of the nation, develop human resources, reduce structural unemployment, increase productivity, and to expand, improve, and update high-quality programs of vocational-technical education.

In 2006, Congress reauthorized the Perkins Act and made major revisions intended to more fully develop students' academic, career and technical skills. The Legislature has incorporated many parts of the Act into Washington law. State law defines career and technical education as "a planned program of courses and learning experiences that begins with exploration of career options; supports basic academic and life skills; and enables achievement of high academic standards, leadership, options for high skill, high wage employment preparation, and advanced and continuing education."

How CTE is delivered in Washington

Career and technical education (CTE) introduces middle and high school students to occupational and technical skills in a classroom setting. CTE programs and courses offer hands-on learning in a wide variety of career paths, including agriculture, business, health and technology. Some also offer college credit for classes taken in high school.

CTE courses are approved by the Office of Superintendent of Public Instruction (OSPI), and designated as either exploratory or preparatory. CTE students learn foundational skills in exploratory courses; preparatory courses focus on building rigorous technical skills. Both incorporate leadership and employability skills – preparing students to meet the demands of the 21st century workplace.

Preparatory courses are often taught at specialized CTE skill centers, which are an integral part of CTE programming in Washington. Skill centers are regional schools that serve students from multiple school districts, providing instruction that is either too expensive or too specialized for school districts to offer individually.

Districts often assemble CTE courses into programs of study that are a coordinated, progressive sequence of classes from exploratory to preparatory coursework. As defined under federal law, a program of study is a set of courses leading either to industry certifications or linked to related postsecondary programs through articulation agreements. To meet federal funding requirements, a program of study must achieve or lead to at least one of these:

- Alignment with a postsecondary program of study
- An industry-recognized credential
- An academic certificate or degree
- Employment

Exploratory CTE courses provide students foundational and occupation-specific skills required to meet industry or national standards. Students explore and gain knowledge of career options, and demonstrate leadership and employability skills. Examples of these types of courses are: Introduction to Technology Foundations, Family Health and Introduction to Materials Engineering.

Preparatory CTE courses are taught at skill centers or traditional high schools. These courses are technically intensive and rigorous. Students demonstrate a mastery of skills that meet industry-defined standards. Completing a sequence of prescribed courses can lead to a certificate or credential necessary for employment, or result in college credit (known as dual credit). Examples of these types of courses are: Welding Technology, Commercial Construction Trades and Digital Electronics.

Students must take at least one credit of "occupational education" to meet graduation requirements

Washington high school students are required to take at least one credit of "occupational education" to graduate. The Washington Administrative Code defines occupational education as:

> *"…A series of learning experiences designed to assist the student to acquire and demonstrate competency of skills…which...are required for success in current and emerging occupations."*

Occupational education courses are not necessarily CTE courses; only those courses that meet standards set by OSPI and are taught by certified CTE instructors are designated as CTE.

Four state agencies and boards are responsible for CTE in Washington

The state's system for administering and supporting CTE programs is highly decentralized. School districts and community and technical colleges make many decisions at the local level. However, the Legislature has given four state agencies discrete responsibilities for providing oversight and establishing policy and standards for the educational system.

- **The Office of Superintendent of Public Instruction (OSPI)** oversees the state's 295 school districts and provides guidance, professional development and program monitoring. OSPI also distributes federal funds to school districts and monitors compliance with Perkins funding requirements.

  OSPI is required by state law to evaluate and approve all district CTE programs and courses to ensure they help address the skills gap. Districts decide what types of CTE programs and courses to offer and develop the content. To inform these decisions, districts are required to work closely with local CTE advisory committees whose members include representatives of business and labor and offer perspectives about local employment needs. On an annual basis, these advisory committees and school boards are required to review, evaluate and approve their districts' 5-year CTE plans. Modifications to the plans are based on these annual evaluations.

- **State Board for Community and Technical Colleges (SBCTC)** must approve new CTE programs offered by the state's 34 community and technical colleges (see sidebar). The colleges decide what CTE programs and courses to offer based on feedback from affiliated advisory committees. Colleges use labor market information when making program decisions. Labor market analysis – including wage data and employment opportunities – is required as part of SBCTC's program approval process. Need studies, or indication of need from an employer, are required to support new and emerging occupations that are not covered by standard forecasts or data. The state also has 10 Centers of Excellence, funded by SBCTC, that serve as statewide liaisons between the educational system and business and labor groups.

A note about the term "colleges" in this report

This audit examines how the state's two-year community and technical colleges support CTE in secondary schools. "Colleges" in this report refers to these two-year colleges; four-year colleges and universities will be identified as such.

- **State Board of Education (SBE)** establishes the state's career- and college-ready graduation requirements and provides advocacy and strategic oversight of public education. SBE also develops policy and approves course frameworks for statewide CTE-related equivalent credit to help CTE students meet graduation requirements. Currently, SBE has three strategic goals related to career readiness:
    1. Promote research-based practices in student personalized-planning experiences
    2. Explore definitions of career readiness
    3. Develop a model course to inform the High School and Beyond Plan
- **Workforce Training and Education Coordinating Board (Workforce Board)** is the primary coordination, planning, evaluation, monitoring and policy guidance agency for the state training system. The Workforce Board administers employment surveys, analyzes occupational skills gap data, and publishes the state's strategic workforce plan. The Workforce Board is also responsible for oversight of programs funded by the Carl D. Perkins Act. The Perkins Act was reauthorized in 2006 to increase the quality of career and technical education. In this oversight role, the Workforce Board tracks and publishes performance measures related to the Perkins Act, and allocates Perkins funding to both secondary and postsecondary institutions.

In addition to these four principal agencies, several others, such as the Washington Student Achievement Council and the Professional Educator Standards Board, shape policy and standards that affect career and technical education.

The state's basic education funding provides about 85 percent of secondary school CTE funding

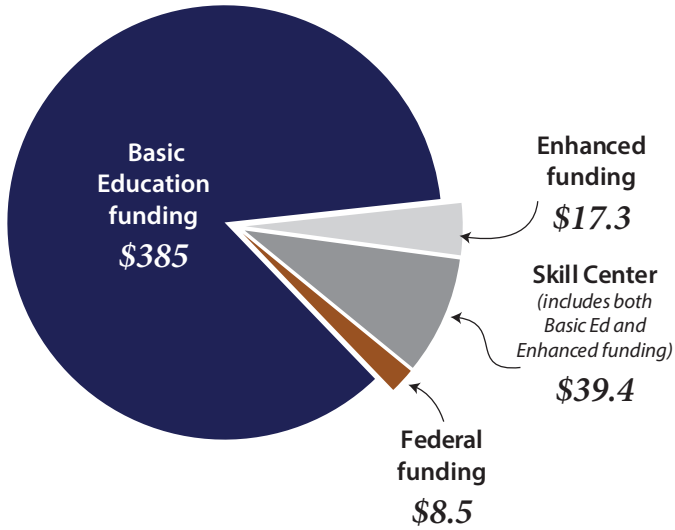
OSPI distributes CTE funding to school districts and skill centers using a per-student full-time equivalent (FTE) formula and federal grants. In the 2016 school year, a total of about $450 million in state and federal money was spent on CTE programs (see **Exhibit 1**). About 85 percent of CTE funding is drawn from the basic education apportionment, which helps pay for teacher salaries, school building maintenance and administrative costs.

"CTE enhanced funding" helps schools pay for the special requirements of CTE courses

Because CTE courses must meet industry standards, they often incur costs beyond typical classroom expenses, driven largely by the need for extra materials or expensive equipment. Teachers also need additional professional development to keep their knowledge, skills and abilities up to date with industry standards. The primary state funding mechanism for these added expenses is a per-student FTE enhancement, which was $283 in the 2016 school year.

Exhibit 1 – The state spent about $450 million in state and federal dollars for K-12 CTE

2016 school year; dollars in millions

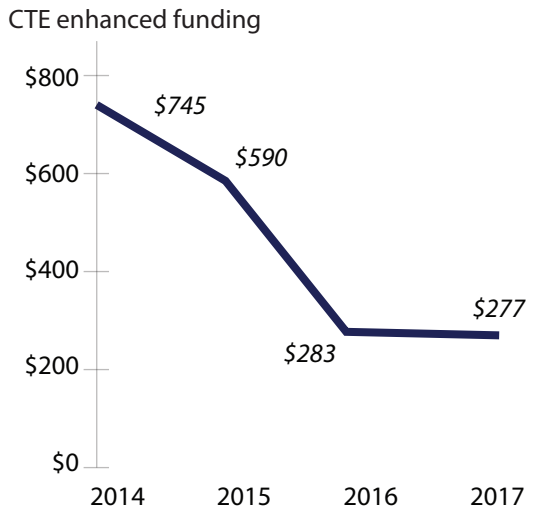


Data source: OSPI Apportionment Report and Workforce Board's Revised Perkins Plan.

Funding challenges have made CTE program delivery more difficult

Exhibit 2 compares funding and student enrollment. OSPI reports that between 2014 and 2017, per-student CTE enhancement declined 63 percent even as CTE enrollment remained steady. Although CTE enhanced funding makes up just 4 percent of total K-12 CTE classroom funding, stakeholders say that this funding is particularly important for high-quality CTE programs.

Exhibit 2 – CTE Enhanced per-student FTE funding declined by 63% while enrollment remained steady between 2014-2017



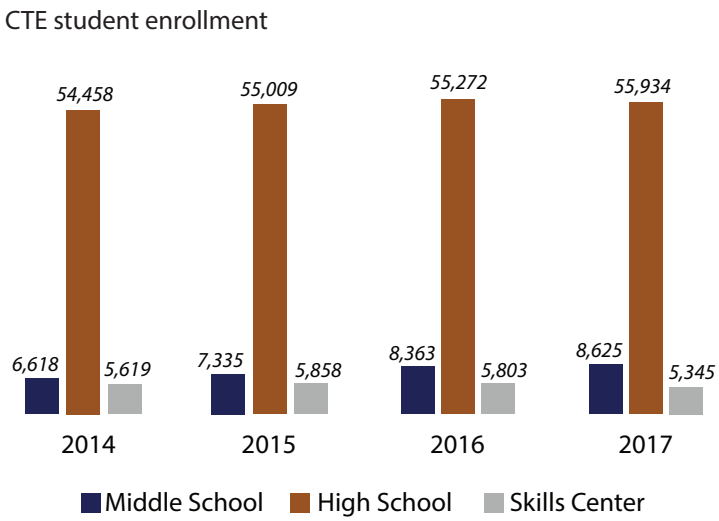


Exhibit 3 breaks out CTE funding by category per student to show more clearly the relationship between decreasing CTE enhanced funding and the increase in basic education funding.

Exhibit 3 – While basic education funding has increased, CTE enhanced funding has declined

2014-2016, 2017 OSPI projection based on current enrollment

CTE funding by category	2014	2015	2016	2017
Basic Education Apportionment per FTE student	$5,284	$5,493	$6,047	$6,131
CTE enhancement per FTE student	$745	$590	$283	$277
Total state funding per CTE FTE student	$6,029	$6,082	$6,330	$6,408
Total state K-12 CTE funding*	**$368 million**	**$379 million**	**$403 million**	**$414 million**
K-12 CTE FTE student enrollment*	61,076	62,344	63,635	64,559

** Does not include funding for Skills Center, Dropout Reengagment CTE and Running Start CTE.*

Source: OSPI Apportionment Report.

The Legislature attempted to address this funding challenge in the 2017 legislative session by increasing the amount of CTE enhanced funding. OSPI said the rules for calculating the number of hours that equate to a 1.0 annual average student FTE will be changing in the 2018-19 school year. With this change, OSPI reports this will result in an estimated 4 percent increase to the CTE enhancement on a per-pupil basis.

Fewer federal dollars support state CTE programs

In 2011, Congress defunded the Tech-Prep program, part of the reauthorized Perkins Act. At one point, Tech-Prep provided more than $2 million in funding to Washington for faculty from high schools and colleges to work together to develop dual-credit opportunities for CTE students. Although diminished, Perkins Act funding continues to support local CTE programs; it is tied to specific requirements for programs of study that help link high school to college CTE programs.

Federal law awards CTE funding to states based primarily on demographics. States have discretion in allocating the money. Up to 10 percent of the funds can be used for "leadership activities." Agency officials said these leadership funds are some of the most flexible and useful funds available to the state's CTE program providers. Washington received $20.6 million in Perkins funds in 2016, of which $8.5 million was dedicated to high school CTE programs. The remainder went to SBCTC and Workforce Board for adult CTE and administration.

State laws require that OSPI establish CTE standards and approve all CTE programs

OSPI is statutorily required to establish the standards for CTE programs in addition to reviewing and approving the CTE plans of local school districts. To receive approval, school district plans must:

- Demonstrate how CTE programs will ensure academic rigor
- Align with the state's education reform requirements
- Maintain strong relationships with local CTE advisory committees for the design and delivery of CTE
- Help address the skills gap of Washington's economy

OSPI is also required to develop a list of statewide high-demand programs for secondary CTE by consulting with the Workforce Board, SBCTC and the Washington State Apprenticeship and Training Council. A high-demand occupation is defined in statute as "an occupation with a substantial number of current or projected employment opportunities."

Districts may recommend additional high-demand programs by submitting evidence of this demand and of consultation with their advisory committees, whose members include business and labor representatives from the community. The law considers these committees an integral part of the program development process. School districts must also demonstrate that approved CTE programs maximize opportunities for students to earn dual credit for high school and college. (Portions of the relevant law, RCW 28A.700, can be found in **Appendix C**.)

Washington identified key shortcomings in the state's CTE system in a recent self assessment

In 2015, the Council of Chief State School Officers (CCSSO), a nonprofit organization dedicated to improving education, partnered with JP Morgan Chase to develop an initiative called New Skills for Youth. The initiative's goal was to identify and promote high-quality state CTE programs through a competitive grant process that would help states identify the principal elements needed for an effective education system that produces career-ready students.

Washington was awarded CCSSO funding to help the Workforce Board, OSPI and SBCTC assess the state's education system against nationally recognized criteria. In late 2016, the three agencies jointly reviewed the criteria and responded to the CCSSO's Career Readiness Initiative Needs Assessment (CCSSO Assessment) to inform the grantor about the current state of CTE in Washington. These responses revealed shortcomings in the state's secondary CTE system. This audit used those responses to describe Washington's CTE landscape.

Scope & Methodology

The scope of this audit examines ways that OSPI and school districts can make students more aware of CTE and apprenticeship career opportunities. The audit also looks at how well CTE courses in high school align with high-growth or stable-growth occupations that are high-paying and the potential causes for any misalignment. Finally, the audit examined how to improve the process of engagement between school districts, colleges and employers to create more dual-credit opportunities for students, reduce redundant efforts and foster greater collaboration.

To identify the leading practices and to determine how Washington could improve secondary CTE programs, we took these steps.

Reviewed:

- Washington state CTE legislation
- CTE legislation and approaches from other states
- Research publications on CTE practices in other states
- Publications by educational experts on leading CTE practices and the resulting benefits
- Studies on the skills gap in Washington
- Council of Chief State School Officers (CCSSO) criteria and a 2016 self-assessment of Washington's educational system that used this criteria
- Secondary to postsecondary CTE articulation and statewide articulation implementation practices in Ohio and Colorado

Interviewed:

- Officials from state agencies, including Office of Superintendent of Public Instruction (OSPI), State Board for Community and Technical Colleges (SBCTC), Workforce Board, Department of Labor and Industries, Washington Student Achievement Council, and State Board of Education
- Officials from 16 school districts, four colleges and two Centers of Excellence
- Officials from Advance CTE, Washington Association for Career and Technical Education (WA-ACTE) and Washington Association of Career and Technical Administrators (WACTA)
- Representatives from the Aerospace Joint Apprenticeship Committee (AJAC) and the Washington Business Alliance
- State CTE directors and administrators in Ohio, Colorado and California

Compared:

- Washington's high school CTE course areas with the highest enrollment in 2015 to those occupations with the highest forecasted growth provided by Washington's Employment Security Department. CTE course area enrollment numbers come from OSPI. Because OSPI collects these numbers from the state's 295 school districts, it would have been cost-prohibitive to audit the accuracy and completeness of these numbers.

The audit did not examine:

- How well CTE courses in the community and technical college system align with high-growth occupations
- How OSPI and school districts could incorporate youth apprenticeships into high school curricula. However, the audit did examine ways that OSPI and school districts could make students more aware of the high-paying jobs that result from apprenticeships.
- The role of Workforce Development Councils and how they interact with school districts
- The State Board of Education, beyond its role in developing statewide course equivalencies for CTE students

Audit performed to standards

The performance audit was conducted under the authority of state law (RCW 43.09.470), approved as Initiative 900 by Washington voters in 2005, and in accordance with generally accepted government auditing standards as published in Government Auditing Standards (December 2011 revision) issued by the U.S. Government Accountability Office. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for the findings and conclusions based on the audit objectives. We believe that the evidence obtained provides a reasonable basis for the findings and conclusions based on the audit objectives.

See **Appendix A,** which addresses the I-900 areas covered in the audit. For more information about methodology and key publications and resources used in this audit, see **Appendix B**.

Next steps

Performance audits of state programs and services are reviewed by the Joint Legislative Audit and Review Committee (JLARC) and/or by other legislative committees whose members wish to consider findings and recommendations on specific topics. Representatives of the State Auditor's Office will review this audit with JLARC's Initiative 900 Subcommittee in Olympia. The public will have the opportunity to comment at this hearing. Please check the JLARC website for the exact date, time, and location (**www.leg.wa.gov/JLARC**). The State Auditor's Office conducts periodic follow-up evaluations to assess the status of recommendations and may conduct follow-up audits at its discretion.

Audit Results

Are secondary career and technical education (CTE) programs and courses aligned with the needs of students and employers?

Are there leading practices that could improve the success of the state's secondary CTE programs?

Answer in brief

Do CTE programs and courses align well with the needs of students and employers?

Based on our analysis and the difficulty that employers report trying to fill numerous mid-level skill jobs, CTE programs and courses could better align with the needs of employers. Such alignment is important to prepare students for the skills needed to enter into postsecondary CTE programs and to obtain these mid-level skill jobs.

What leading practices could improve the success of the state's secondary CTE programs?

The audit identified four areas that could improve the alignment between the courses students are offered and job opportunities. If state agencies adopt leading practices in these areas, Washington could create more opportunities for students while closing the gap between students' skills and employers' needs. The four areas are:

1. Improve career guidance given to students, and provide it in a classroom setting in the 7th or 8th grade
2. Strengthen employer engagement to better align CTE programs and courses with high-wage industry-needed skills
3. Update the list of high-demand programs, strengthen the review of local labor demand data and clarify laws to help reduce the skills gap
4. Expand the number of CTE dual-credit opportunities to increase the number of pathways from high school to college

1. Improve the career guidance given to students, and provide it in a classroom setting in the 7th or 8th grade

Introducing students to the many careers and jobs available after high school could help them choose occupations that pay well but may not require a four-year degree. Paths to such careers include taking courses in high school that align to CTE courses in colleges or apprenticeships. OSPI and district CTE officials said many children and their parents are unaware of the options available to them, which can become a problem when students try to develop their High School and Beyond Plan. While recent legislation requires an inventory of each student's career interests and skills in the 7th or 8th grade, more could be done to address this lack of awareness. According to educational research, a major reason that students drop out of high school is they cannot see the connection between their high school courses and a job. Helping students explore the many career options that are available to them in a comprehensive way in the 7th or 8th grade is a recommended practice incorporated in career focused educational models to address this problem.

The Association of Career and Technical Education and the Council of Chief State School Officers said that when students are given better upfront information about career opportunities, and an understanding of local, regional and state labor market conditions, they can make more informed educational choices that help them prepare for entering the job market.

The **High School and Beyond Plan** is a personalized plan designed to help students make informed choices about what courses to take in high school and identify their career and educational goals for the future. This is a non-credit graduation requirement for every student.

Legislation passed in 2017 requires that all students initiate their High School and Beyond Plan in the 7th or 8th grade and develop an inventory of their career interests and skills.

More information about CTE options may help students discover other high-wage job opportunities

District CTE directors, officials at OSPI and SBCTC and one business group reported that high schools focus on steering students to four-year university degrees rather than to CTE-related careers. When teachers, counselors and administrators recommend only a bachelor's degree, few students and parents are aware of the high wages and lower educational costs that can result from CTE and apprenticeship career paths.

Business groups, OSPI officials and educators report that schools need to do a better job of promoting CTE and apprenticeships, and the careers that are available in various industries. State legislators have also concluded there is a lack of awareness about CTE opportunities, noting:

> *"The legislature further finds that teachers, counselors, students, and parents are not well-informed about the opportunities presented by high quality career and technical education." (RCW 28A.700.005 (3))*

Three barriers likely contribute to a lack of CTE awareness:

- **Too few counselors –** The American School Counselor Association recommends a student-to-counselor ratio of no more than 250 to 1. Washington's ratio is about 500 to 1, which limits the amount of time counselors have to discuss career options with students and parents. OSPI and SBCTC officials said that this problem is magnified when counselors emphasize only four-year degrees.
- **An occupational education requirement that does not give students enough exposure to the many CTE opportunities that are available –** Every high school student is required to take a one-credit occupational education course to graduate. Students may take the course in any semester before graduation, and select from dozens of topics. They may choose a single course in an area that, while useful or personally enriching (such as typing, photography or personal fitness), is nonetheless a low-growth, low-paying occupational area. For many students, this may be the only CTE course they take. As part of the required High School and Beyond Plan, students must identify courses of interest for their own personalized educational pathway. Legislation passed in 2017 now requires that all students initiate their High School and Beyond Plan in the 7th or 8th grade. This legislation requires schools to work with students to develop an inventory of each student's career interests and skills. **Appendix D** shows the essential elements of a high quality High School and Beyond Plan as identified by the State Board of Education.
- **Limited online career guidance tools –** Washington's Workforce Board maintains the Career Bridge website for job-seekers. While the site has strong content, it could be tailored more toward students. Both OSPI and SBE said some school districts have opted to pay for other career development software to help students explore their personalized career pathways.

Washington schools are not required to provide a class to students that explores multiple career options

Washington does not require schools to offer any sort of comprehensive overview class that addresses the costs and rewards of multiple occupational paths. Local school districts make their own decisions about what types of career guidance courses to offer. Consequently, students may not learn about CTE or apprenticeship opportunities early enough in high school to take action and begin earning credits for courses that correspond with high-paying fields.

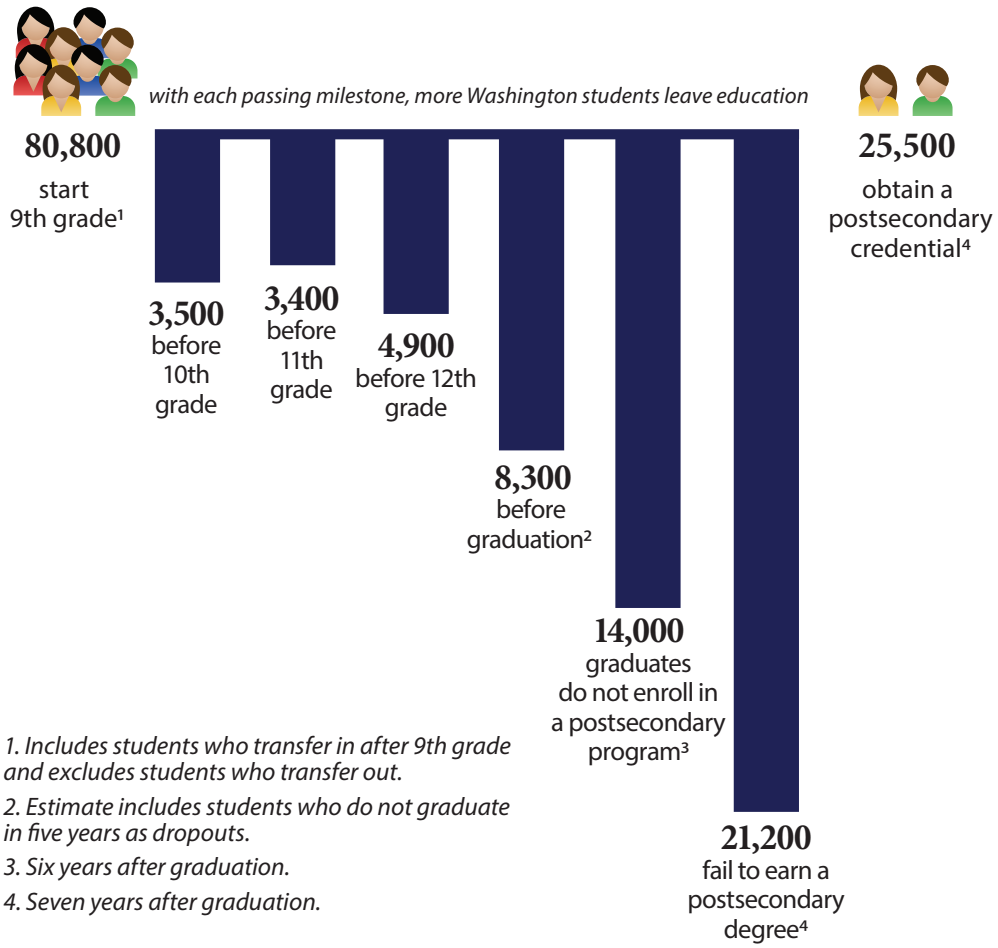
Students who are at risk of falling into one of these groups could benefit from receiving career advice early in their high school years:

- Students who start 9th grade but do not graduate from high school
- High school graduates who did not take CTE courses and do not enroll in higher education or participate in an apprenticeship
- Students who enroll at one of Washington's four-year public colleges and universities, but do not receive a bachelor's degree within seven years

High school graduates who do not complete CTE programs, apprenticeships, college degrees or college certificates contribute to the state's skills gap. High school dropouts further contribute to this gap. Failure to complete at least some of these educational milestones makes it more difficult for students to find good jobs at high wages and for employers to find skilled workers.

In the *Washington Kids 4 Washington Jobs* report, the Washington Roundtable and Boston Consulting Group examined the outcomes of students enrolled in Washington high schools and expected to graduate with the class of 2006. **Exhibit 4** illustrates how many students dropped out before graduation, never enrolled in a college or failed to complete a degree within seven years of graduation. Of the 80,800 students, less than one-third obtained a postsecondary credential.

Exhibit 4 – Washington students fall behind early and fall out of education over time



1. Includes students who transfer in after 9th grade and excludes students who transfer out.

2. Estimate includes students who do not graduate in five years as dropouts.

3. Six years after graduation.

4. Seven years after graduation.

Notes: Numbers are rounded. Data analysis unaudited.

Source: Washington Kids 4 Washington Jobs Report 2016, the Washington Roundtable, and Boston Consulting Group. Data from Educational Research and Data Center and OSPI.

Greater awareness could draw more people to higher paying occupations and help close the state's skills gap

In *A Skilled and Educated Workforce* (published in 2015), the Washington Student Achievement Council, SBCTC and Workforce Board identified the types of occupations that might be open to CTE students, typically requiring more education than high school, but not a bachelor's degree. The list of mid-level-skill occupational groups includes production and trades, which form nearly one-third of the state's skills gap. For this occupational group, the projected gap between

supply and demand totaled 3,259 job openings. Some of the high-paying jobs in this category include carpenter, electrician, plumber, sheet metal worker, pipe fitter and many others. Workers in these fields typically enter into paid apprenticeships (discussed further in **Appendix E**); once they complete them, many earn more than the state average annual wage of $54,000. **Exhibit 5** shows the skills gap for all mid-level occupational groups based on projected workforce needs from 2018 to 2023.

Exhibit 5 – Introducing more students to production and trades occupations through CTE could help meet demand for mid-level-skilled labor

Mid-level-skill gaps for all occupational groups

Mid-level occupational groups	Supply	Demand	Gap
Service occupations	4,435	7,791	3,356
Production and trades	6,182	9,441	3,259
Business, management, sales	7,615	10,288	2,673
Computer science	668	1,385	717
Human and protective services	998	1,592	594
Educators	1,351	1,875	524
Media, design, communications	922	1,305	383
Research, science, technical	317	510	193
Administrative, clerical	6,281	6,308	27
Engineering	641	388	(253)
Legal	511	185	(326)
Health professions	5,794	4,664	(1,130)
Total	**35,715**	**45,732**	**10,017**

Note: Unaudited data.

Source: *A Skilled and Educated Workforce,* published by SBCTC, Workforce Board and Washington Student Achievement Council, 2015.

Increasing student awareness of multiple career paths is recognized as a leading practice

To increase student awareness of multiple career paths, research suggests schools offer career exploration courses or counseling to students by the 9th grade. The University of Chicago found that 9th grade is:

> *"…a pivotal year that provides a unique intervention point to prevent school dropout…when schools concentrate their efforts on helping students make a successful transition to 9th grade, it results in dramatic increases in graduation."*

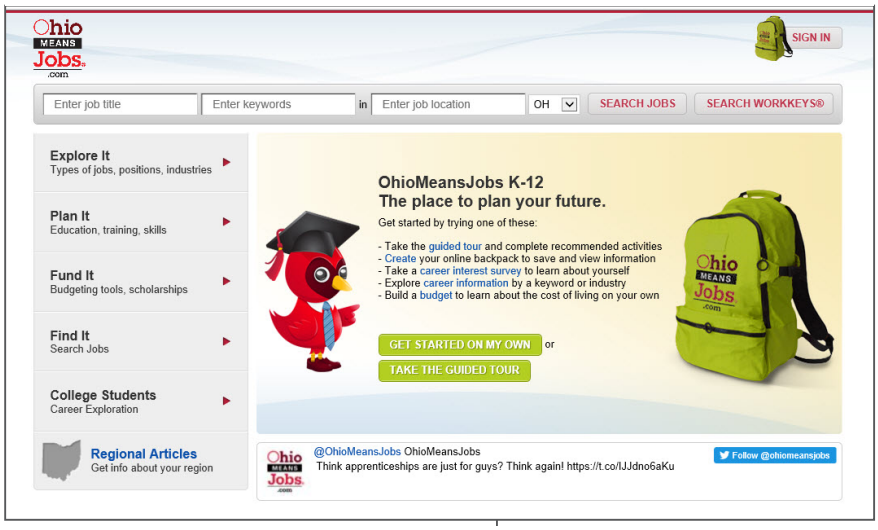
Another study from January 2013, funded by the Institute of Education Sciences, the U.S. Department of Education and the Bill and Melinda Gates Foundation, made a similar observation:

> *"…raising college and career awareness early in high school rather than waiting until the senior year can be beneficial, because students can take steps earlier to prepare for their futures."*

According to educational research, a major reason that students drop out of high school is they cannot see how their high school courses connect to work. Helping students explore the many career options that are available to them by the 9th grade is a recommended practice incorporated in career focused educational models to address this problem. High school dropouts are more likely to lack the skills needed to help fill the state's skill gap.

An informative careers website can help teach students and parents about CTE and apprenticeship opportunities. One example of a student-friendly careers website is run by Ohio (illustrated in **Exhibit 6**). It is interactive and has a K-12 specific interface that students can use to explore what career fields might interest them most. Students can learn about skills needed for high-demand jobs and apprenticeships, create profiles, save favorite jobs and colleges, create a resume, and record practice interviews specific to a particular industry.

Exhibit 6 – Home page screen of Ohio's careers website



Source: https://jobseeker.k-12.ohiomeansjobs.monster.com/seeker.aspx

More can be done to inform students about CTE career pathways

To help school districts increase student awareness of CTE and apprenticeship opportunities:

- OSPI can develop a model course framework that teaches students about multiple career opportunities
- The Workforce Board can improve the state's Career Bridge website

OSPI can develop a model course framework that teaches students about multiple career opportunities

One targeted outcome of the CCSSO Career Readiness Needs Assessment (CCSSO Assessment) is that

> *"all career pathways [should] begin broadly, focusing on career awareness and exposure; progress to more occupationally-specific courses; and offer multiple entry and exit points to enable students to change paths as their interests and goals evolve."*

After reviewing other states' practices and recent research, this audit recommends a new statewide, model course framework, developed by OSPI, required for all students in the 7th or 8th grade. This course should inform students about the costs and benefits of a broad sample of the career paths open to them, at an age when they can take advantage of the options education can offer.

Officials at OSPI and other state agencies said the state should provide students with at least one course that informs them of the numerous postsecondary CTE, apprenticeship, military and four-year professional paths that are available, including the educational costs and incomes associated with each. Such a course could help point more students toward high-paying careers that do not require costly university degrees and are in demand in Washington's economy.

The course could also provide a cost-effective way of connecting more students with age-appropriate career guidance, bearing in mind that the typical school counselor serves a large number of students. In terms of content, the class should:

- Teach students about the multiple career paths and educational costs and anticipated incomes that accompany them
- Incorporate the development of the High School and Beyond Plan
- Inform students about dual-credit opportunities that exist with CTE programs. (This topic is discussed in detail in Section 4, below.)

Both OSPI and the Workforce Board expressed support for such a required course, although middle school funding requirements might need to be modified to pay for it. Currently, only STEM-related middle school courses may be paid for with CTE funds. OSPI officials further said they were open to developing this course framework, and said a handful of districts have already developed similar types of courses. OSPI said these existing courses can be reviewed to ensure they meet the requirements of a new statewide course framework. This course should meet one of the desired outcomes noted in the CCSSO Assessment, which is the presence of "evidence-based, scalable career advisement models" in regions across the state "to help all students – beginning in middle school – make sound, well-informed decisions about course and pathway participation."

Workforce Board can improve the state's Career Bridge website

Washington's Career Bridge website (illustrated in **Exhibit 7**) is funded and maintained by the Workforce Board. It offers similar information to Ohio's site. The Career Bridge website allows users to learn about the various career opportunities that correspond with their interests. It provides users with information about the:

- Educational requirements and wages associated with these opportunities
- Regional cost of living and the incomes necessary to cover planned costs

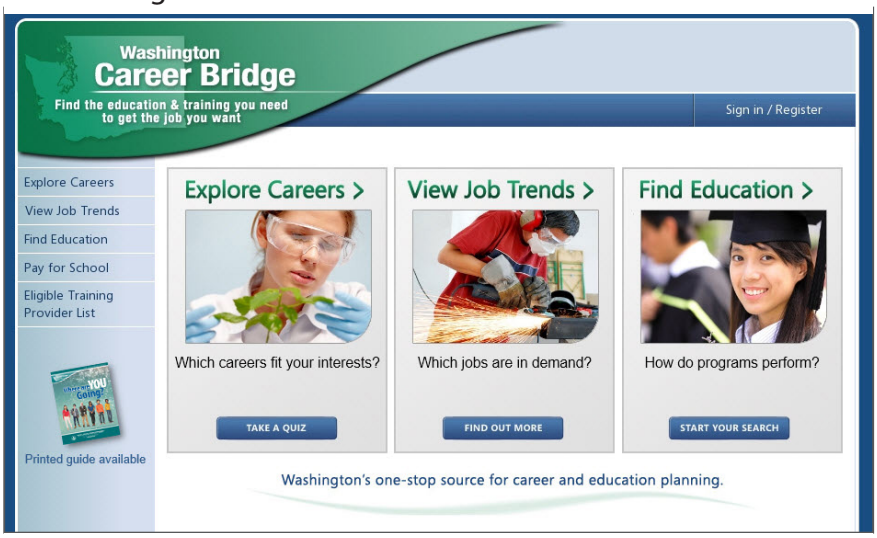
The website links to information about apprenticeships for K-12 students, which is provided by Department of Labor and Industries. However, much of the Career Bridge website's navigation is tailored more toward adults than high school students. An improved, one-stop website with a specific K-12 interface would let students and parents more easily explore the skills necessary for high-demand jobs. Once improved, Career Bridge could become a more useful tool and component of the new model course discussed above.

According to the U.S. Department of Education's 2014 National Assessment of Career and Technical Education, one benefit of engaging youth in CTE programs is that they are more likely to graduate.

For example:

- Tacoma School District's CTE Director told us that some students who had attendance problems in academic classes consistently attended a summer certification program related to the merchant marines without missing a day.
- New York City's school system reported that high schools with CTE programs have higher attendance and graduation rates than those without.

Exhibit 7 – Home page screen of Washington's Career Bridge website



Source: http://www.careerbridge.wa.gov

2. Strengthen employer engagement to better align CTE programs and courses with high-wage industry-needed skills

Businesses report difficulty finding job candidates with the technical skills they need. More coordinated outreach through CTE advisory committees would strengthen school districts' ability to incorporate the industry skills employers need into coursework. The CTE courses schools currently offer do not always reflect the skills and trades most in demand. To prepare students for the postsecondary world of education and work, Workforce Board, OSPI and SBCTC can do more to ensure that schools and colleges strengthen their engagement with employers. Establishing a systematic approach to engagement could achieve three benefits: better aligning industry expectations across college and district CTE curricula; reducing some of the duplicative effort employers expend by serving on multiple committees; and allowing regional employers to reach a wider group of schools and colleges.

Employers have reported Washington job applicants lack needed skills or credentials

In 2016, the Washington Roundtable, whose board consists of private sector executives who seek policy changes to improve economic vitality, reported that employers can find only 25,000 Washington residents to fill the 38,000 jobs each year that require some sort of credential. Consequently, employers must hire candidates from other states to meet their needs. The Roundtable concluded that the state's educational system is not equipping graduates with the skills that make them employable.

Skill-Up Washington, a non-profit organization that connects low-income individuals with living-wage jobs in high-demand fields, identified a similar skills gap. In the March 2016 Manufacturing Employer Survey of 66 Washington manufacturers, Skill-Up found that 74 percent had difficulty hiring for certain positions that included entry-level manufacturing jobs. For those that had difficulty, the top two reasons were applicants' lack of relevant work experience (76 percent of respondents) and lack of occupational or technical skills (65 percent of respondents).

Research by the Washington Student Achievement Council, SBCTC and Workforce Board also identified a gap between the needs of Washington's businesses and the skills of graduates. In 2013 and 2015, these agencies compared employers' demand for mid-level-skill occupations to the availability of qualified in-state workers. Workforce Board reports that mid-level-skill occupations include those that require a certificate or a two-year degree from a college or a private career school. Their research found large workforce shortages, extending through or beyond 2021, for the occupational areas listed in **Exhibit 8**.

Exhibit 8: Employment areas that have a skills gap

- Manufacturing, production and trades (includes auto and diesel mechanics and machine tool technicians)
- Human protective services (includes firefighters, criminal justice and law enforcement)
- Computer science
- Selected health occupations
- Business, management and sales occupations (includes accountants)
- Service occupations (includes management jobs in culinary and hospitality fields)
- Installation, maintenance and repair

Source: *A Skilled and Educated Workforce – 2013 and 2015 Update*

OSPI, SBCTC and Workforce Board have recognized that the education system must better identify high-skill, high-demand occupations and incorporate them into CTE programs. In their CCSSO Career Readiness Needs Assessment, the three agencies reported:

> *"There is no cross-system state-wide process that regularly convenes K-12, postsecondary education and workforce development communities with a primary focus on reviewing labor market information and establishing career pathway priorities."*

Employers have difficulty engaging the many players in Washington's educational system to discuss employment needs

Washington's school districts and colleges are required to have advisory committees to help them identify local employment needs and select CTE course offerings. Districts and colleges sometimes rely on the same local employers to serve on their individual advisory committees. One business association representative said that such demands can overload individual employers and create inefficiencies for both businesses and educators.

Officials at Workforce Board acknowledged that businesses with regional or statewide job openings struggle to engage districts and colleges because they must discuss their skill needs with each one individually. Washington Business Alliance also characterized the state's education system as difficult for employers to engage.

OSPI officials said some districts have found that having a CTE advocate in district leadership is necessary to maintain relationships with the local business community. For example, Evergreen School District in Clark County hired an employer liaison to partner with employers. This person works with targeted industries to identify CTE programming opportunities where there are significant employer needs but a small supply of job candidates. However, other districts have not established such a position and may not have the resources to do so. Even with such a position, districts may still lack a regional or statewide employment perspective.

Some CTE directors said an additional barrier to effective employer engagement is a lack of interest by some districts and colleges in partnering with one another. This is unfortunate because colleges use labor market information when making program decisions. Labor market analysis – including wage data and employment opportunities – is required as part of SBCTC's program approval process. Need studies, or indication of need from an employer, are required to support new and emerging occupations that are not covered by standard forecasts or data. This lack of partnering is particularly problematic for the smaller districts that have the fewest resources. Without a coordinated, statewide approach to gaining meaningful industry input, individual districts may be unaware of some high-demand employer needs and the corresponding student opportunities that accompany them as they develop their CTE programs and courses.

The state's approach to employer engagement may limit the alignment between CTE courses and job opportunities

The audit compared CTE course area enrollments (see sidebar) to corresponding high-paying occupations that are projected by the Employment Security Department (ESD) to have high 10-year growth rates. ESD has forecasted about 409,000 average annual job openings over a 10-year period.

Exhibit 9 compares the 10 CTE course areas with the highest enrollments to ESD forecasted job openings and shows whether the average annual wage for each job category is above or below the state average of $54,000.

The analysis suggests the CTE course areas with the most enrollments do not strongly align with high-paying and high-growth occupations. Moreover, 14 percent of all CTE course areas had no clear alignment to any occupations ESD tracked; examples include independent living, personal choices and interpersonal relationships. For this reason, the courses making up the 14 percent have been excluded from the analysis shown in Exhibit 9.

How the audit counted CTE enrollments

To determine CTE enrollment counts, students were counted once for each unique CTE course they were enrolled in the 2015 school year. For example, if a student enrolled in two agriculture courses and a photography course during the school year, they would be counted three times. This standardized measurement allows us to assess how well CTE courses align with areas of high job growth. (See **Appendix B** for more details.)

Exhibit 9 – Ten CTE course areas with the highest enrollment could more strongly align with high-wage, high-demand occupational areas

Percent of CTE enrollments in 2015 school year; Percent of forecasted job openings through 2024; Job ranking out of 284 groups of related occupations; State average wage $54,000 in 2015

CTE course areas (highest to lowest enrollment)	Percent of CTE enrollments	Average annual jobs		Average wage	
		Percent of jobs	Rank	Below or above $54,000	For this occupation
Data Entry	8.3%	< 0.1%	146	↓	$35,950
Design	5.3%	0.16%	93	↓	$51,690
Photography	4.5%	< 0.1%	147	↓	$40,559
Interpreter/Translator	4.2%	< 0.1%	155	↓	$39,535
Family and Consumer Sciences	3.9%	< 0.1%	258	↑	$55,077
Dietetics/Nutrition	3.9%	< 0.1%	201	↑	$54,762
Marketing Management & Research	3.7%	0.59%	43	↑	$96,615
Agricultural/Food Sciences	3.7%	< 0.1%	213	↑	$62,753
Drafting	3.6%	0.11%	122	↑	$68,219
Communication Technologies	3.3%	< 0.1%	140	↓	$51,060

Note: CTE course areas are defined by Economic Development and Employer Planning System (EDEPS) occupational groupings, not by OSPI program areas or career cluster groupings.

Data source: Auditor analysis of unaudited OSPI secondary CTE enrollment data, forecasted ESD employment data, EDEPS occupational groupings, and U.S. Bureau of Labor Statistics wage data.

The percentage of overall CTE enrollment for all of these course areas was greater than the percentage of forecasted job openings, and half paid wages that were lower than the state's average. (**Appendix F** shows similar results for all the course areas that make up 75 percent of total CTE enrollment.)

CCSSO describes high performing CTE systems as those where states:

> *…make their high school programs more responsive to the labor market by enlisting the employer community as a lead partner…States need a new "demand-driven" system for determining which programs and pathways warrant continued development and investment, and which should be scaled down and phased out; a system that places a greater value on preparing students for high-paying, in demand jobs.*

Consistent with the CCSSO criteria, the Legislature intended for secondary CTE to increasingly focus on high-demand fields to better prepare students for jobs with options for high wages. With this focus in mind, state law requires district CTE plans to help address the state's skills gap. State law also requires OSPI to establish a list of statewide high-demand programs for secondary career and technical education. But districts may also propose additional high-demand programs by submitting evidence of local high demand. State law does not extend these requirements to the course level. However, because most CTE course enrollments are in course areas that do not strongly align with high-wage, high-demand areas, this suggests that CTE plans and programs could be strengthened to better meet the increased focus on high-demand fields and OSPI's CTE vision (noted in the sidebar).

OSPI's vision for CTE

Educational and workforce leaders partner to engage students and prepare them for life successes through multiple career pathways that are relevant to student interests and responsive to the needs of employers and the economy.

This audit did identify CTE course areas, such as computer systems and business management and administration, in high-wage, high-demand occupations that made up the top 75 percent of CTE course area enrollments, listed in **Appendix F**. The audit also identified high-wage or high-demand CTE course areas, such as firefighting, health occupations, manufacturing and the trades, that were not in the top 75 percent of enrollments.

Approaches for identifying additional opportunities for CTE programming

One way to assess CTE programs is to compare CTE course enrollment with those occupations that are forecasted to have the highest number of job openings. **Appendix G** shows a comprehensive table listing the top 75 percent of forecasted job openings that have corresponding CTE courses, which may show where there are more opportunities for new CTE programs. Another way to assess the opportunities that exist with high-demand occupations is shown in **Appendix H**. This appendix shows high-demand areas that do not have corresponding CTE courses.

The state can provide more opportunities to CTE students not only by improving alignment of CTE courses with high-wage, high-demand occupations, but also high-wage, stable-demand occupations. For purposes of this audit, high-wage stable-demand occupations are defined as those that pay higher than average wages, but do not have a substantial number of openings or have below average growth.

The primary sources of data used in these analyses consisted of forecasted employment data from ESD and secondary CTE enrollment data from OSPI. But school districts and their local advisory committees may not have the skills or resources to analyze this type of data, which inhibits their ability to make informed decisions about the direction their CTE courses should take.

Leading practices suggest engaging employers to identify high-demand occupations can guide CTE program offerings

Industry researchers say that because of CTE and workforce development's close ties, educational agencies, workforce boards and local school districts must work together.

For example, the Ohio Governor's Office of Workforce Development coordinates strategically with the leaders of the state's business community. Officials work with business partners to develop a list of in-demand occupations and industry-recognized credentials that drive programming across the state's CTE schools. They also work together to identify community-specific industry-recognized credentials that may differ from the statewide in-demand occupations.

Workforce Board, OSPI and SBCTC could do more to help district and college advisory committees engage employers on a regional basis

One strategy to engage employers more effectively is to coordinate school district and college advisory committees within a region. Doing so could achieve three benefits: better aligning industry expectations across college and district CTE curricula; reducing some of the duplicative effort employers expend by serving on multiple committees; and allowing regional employers to reach a wider group of schools and colleges.

This coordinated approach is supported by Workforce Board, OSPI and business association representatives. In fact, state agencies identified these problems in their CCSSO Career Readiness Needs Assessment:

> *"…Schools, the workforce system, and CTCs often work separately; even within a region, employer led processes in these systems may be duplicative, redundant, or not shared."*

The assessment also said that the state needs better ways to store and share results of employer-led discussions. This information is not usually shared with OSPI to inform the programs.

While some districts may use a coordinated approach, OSPI reported in the CCSSO Assessment that this approach is not common across the state. SBCTC recognizes the importance of regional coordination in its policy manual and guidelines for college-level advisory committees, emphasizing the benefits of reducing the burden upon businesses. The increased coordination permitted within regional committees can also produce greater continuity in course offerings between secondary and postsecondary institutions.

Kennewick School District meets with businesses as part of an area-wide cooperative committee with six other school districts.

"It needs to be a win-win for businesses – they don't need to be on seven different advisory committees for the same thing."

~ Source: Kennewick School District CTE Director

Workforce Board is well-positioned to take the lead in engaging Washington employers

Just as the Governor's Office of Workforce Development takes a leading role in Ohio, Washington's Workforce Board is well-positioned to help OSPI and SBCTC identify high-wage, high- or stable-demand job sectors in a coordinated fashion. The CCSSO Assessment noted that the state needs to improve employer engagement and the sharing of labor market data. It concluded that the state should:

> *"Establish protocols and venues for cross system review of labor market data to plan high-demand, high-skill pathways and systematically identify over time how to identify gaps…continually integrate OSPI, [Workforce Board and colleges'] employer engagement efforts to ensure that this work is shared and streamlined…"*

State law already gives Workforce Board authority to solicit employers' feedback about how CTE programs align with their needs. Workforce Board is also required to help OSPI prepare a list of high-demand programs.

Officials at Workforce Board said they are best positioned to collect feedback from businesses that have regional or statewide job openings and to share that information with districts and colleges. Such data could supplement the conversations with employers that already take place at the district and college levels. Workforce Board could help improve secondary CTE business engagement as it implements the state's workforce strategic plan, "Talent and Prosperity for All," which was approved in 2016. One of the plan's four strategic goals aims to increase employer engagement across the state.

3. Update the list of high-demand programs, strengthen the review of local labor demand data and clarify laws to help reduce the state's skills gap

OSPI currently lacks an updated list of statewide high-demand programs, which state law requires to help inform school districts about what types of programs are needed. When districts want to propose additional CTE programs, state law requires them to submit evidence of local high demand to OSPI when seeking approval for those programs. To ensure that each district's CTE programs help address the state's skills gap, OSPI reviews this evidence before approving the district's CTE plans. OSPI could strengthen the approval process for new and existing programs if it consistently reviewed actual labor market data or analysis that is sufficient to demonstrate high demand. Collecting and reviewing this type of evidence for all CTE programs and having the Legislature define key terms in the state's CTE statutes would help OSPI to better assess whether district CTE programs are helping to address the skills gap.

Below are four areas that either OSPI or the Legislature needs to address to improve efforts to ensure that secondary CTE programs are helping address the state's skills gap:

- OSPI lacks an updated list of high-demand CTE programs as state law requires
- Districts are not required to submit labor market data or analysis that is sufficient to demonstrate high demand. This evidence might help OSPI better assess whether district CTE programs help address the skills gap
- Some course equivalencies might limit how well CTE programs align with high-wage, high demand occupations
- State laws governing CTE contain undefined terms

Update the list of high-demand CTE programs as state law requires

OSPI is required by state law to work with SBCTC, Workforce Board and the Washington State Apprenticeship and Training Council to develop a list of high-demand programs for the benefit of secondary CTE, but this list has not been updated since 2009. The law's intent is to help OSPI focus secondary CTE programs on current high-demand areas that help address the state's skills gap. Without an updated list of high demand programs, districts are missing valuable information that could help improve their CTE programming.

The U.S. Department of Education found problems associated with states' limited role in determining CTE programming in the Department's 2012 publication, *Investing in America's Future: A Blueprint for Transforming Career and Technical Education*:

> *"…the current [Perkins] Act does not require states to systematically identify the economic needs and priorities of the state, regional, or local economies when making decisions on which CTE programs should be funded...As a result, local program administrators…cannot make informed decisions on which programs to support…"*

CCSSO recommends that states establish the structures and processes that assure that high-wage, high-demand programs are identified using reliable labor market information.

The Department's proposed solutions are consistent with Washington's requirement for a statewide list of high demand programs.

> *"In collaboration with its workforce and economic development agencies, each state would identify in-demand occupations in high-growth sectors on which CTE programs...would focus. States then would disseminate this information to local CTE administrators to ensure that programs are responsive to labor-market needs and aligned with regional priorities for economic growth."*

Require districts to submit actual labor market evidence demonstrating high demand for both new and existing CTE programs

Districts must obtain OSPI approval for new CTE programs based on evidence of local high demand. State law directs districts to submit evidence that demonstrates how new CTE programs align with local high-demand fields when those programs are not part of OSPI's list of high-demand programs. OSPI is required by law to consider this evidence before approving new CTE programs. State law requires districts to submit this evidence after having first consulted with an advisory committee.

OSPI guidance currently allows school districts two options for demonstrating how CTE programs help address the skills gap:

- Districts may submit advisory committee approvals in the meeting minutes with an attestation that these approvals were based on review of evidence of labor market demand. However, officials from Workforce Board, OSPI and the Washington Business Alliance said that the rigor that these committees demonstrate when reviewing and approving district CTE programs and courses can vary across districts.
- Districts may submit the actual evidence of labor market demand instead of the committee meeting minutes.

Evidence of local high demand is not required for existing programs. State law does not require districts to periodically resubmit evidence that demonstrates how existing CTE programs align with local high-demand fields. Currently, districts attest to whether there have been any changes to their existing programs through OSPI's five-year re-approval process. However, there is no ongoing requirement that current evidence of local labor market demand be periodically resubmitted to OSPI to demonstrate that existing programs remain in high-demand. Consequently, over time, there is a risk that some programs that once corresponded with local high demand may no longer do so.

With help from the Legislature, OSPI could strengthen the approval process for ensuring that new and existing CTE programs are helping address the state's skills gap. OSPI could improve the approval process for new CTE programs if it consistently based its review on the actual labor market data or analysis that sufficiently demonstrates high local demand. OSPI currently accepts advisory committee approvals in the meeting minutes with an attestation that these approvals were based on review of evidence of labor market demand. OSPI could further improve the approval process with additional funding and new legislation requiring districts to also submit actual labor market data or analysis for existing CTE programs when OSPI re-approves them every five years.

In Rhode Island, the Commissioner for Elementary and Secondary Education is responsible for ensuring that current labor market information is analyzed to inform the creation or expansion of career preparation programs in critical or emerging industries. Rhode Island gave the Commissioner this responsibility to increase the number of CTE programs that align with the needs of employers.

As discussed in more detail earlier, SBCTC has established robust expectations for the evidence that colleges must submit when seeking approval of their CTE programs. OSPI should encourage districts to engage with local colleges to obtain their labor market data and analysis wherever applicable and submit it when seeking CTE program approval.

With additional funding and new legislation, these steps would not only strenghthen OSPI's ability to ensure that district CTE plans are helping to address the state's skills gap, they would also help improve the alignment with high-wage, high-demand occupations listed in Exhibit 9 on page 26.

Evaluate how some course equivalencies might limit how well the state's CTE programs align with high-wage, high-demand occupations

School districts are required to adopt CTE course equivalencies and offer them to students at high schools and skill centers. Through course equivalencies, students can take CTE courses that satisfy two graduation requirements while earning one credit. This allows students greater flexibility in meeting graduation requirements while preparing for their career of interest. SBE and OSPI have developed and approved more than 30 statewide CTE course equivalency frameworks. These frameworks allow CTE courses to result in credits in subjects like algebra, geometry and lab science. School districts also have the authority to develop local course equivalencies. At a minimum, districts must grant academic course equivalency in mathematics or science for high school CTE courses either through statewide or local CTE course equivalency frameworks. To help them, OSPI has issued guidance that tells districts how CTE courses can meet student graduation requirements in areas such as math, science, English, health and fitness, and art.

In the past, some CTE directors expressed concern that course equivalencies might dilute the "career and technical" focus of CTE programs. OSPI, Workforce Board, SBCTC and other CTE stakeholders said that some districts:

- Adapt their basic education courses to meet CTE course standards to increase funding from the state
- Select CTE programs and courses that are more affordable or can easily meet multiple graduation requirements through course equivalencies

As shown in Exhibit 9 and Appendix F, those CTE course areas with the highest enrollment did not strongly align with high-wage, high-demand occupations. This may be partly because some CTE course equivalencies do not strongly align with high-wage, high-demand occupations. For example, students can meet the graduation requirement for art by taking CTE courses in photography, jewelry making, theater design and floral design.

Define key terms used in state law governing CTE

This audit found undefined statutory terms, which contribute to a lack of clarity around the Legislature's intent for CTE programming. Under state law, OSPI must approve all district CTE plans and programs to ensure that they help address the skills gaps of Washington's economy. However, the term "skills gap" is undefined in statute.

The Legislature might have intended the term to mean a condition in which "the number of students per year prepared for employment from in-state programs is substantially fewer than the number of projected job openings per year in that field" (RCW 28A.700.020 (2)(b)). The Legislature might also have intended it to mean "occupations with a substantial number of current or projected employment opportunities" (RCW 28A.700.020 (2)(c)). Another possible definition is "the number and type of higher education and training credentials required to match employer demand for a skilled and educated workforce" (RCW 28B.77.080 (3)).

In addition, the statutory language defining CTE refers to preparing students for "high wage" employment options but does not define what constitutes a high wage. Oregon recognized the need for a common definition of high wage. In 2007, the Oregon Employment Department collaborated with the Oregon Workforce Investment Board, Oregon Department of Education and others to define high wage as "paying more than the all-industry, all-ownership median wage for statewide or a particular region."

Clarifying these laws would help ensure that CTE programs meet legislative intent.

4. Expand the number of CTE dual-credit opportunities to increase the number of pathways from high school to college

Students can take CTE courses in high school that align with similar courses in college programs, allowing them to gain "dual credit" at the college. This dual credit is typically achieved through articulation agreements negotiated between one high school and one college. While all colleges are required to give equivalent credit, some may only award the credit as an elective. Articulated CTE courses offered and transcripted by one college might not be accepted towards the same CTE program at another college. This could lead to students having to retake courses when they enter or transfer to other colleges.

Articulation agreements specify the curriculum and teacher qualifications required for high school students to receive college level credit (dual credit).

The content and number of agreements can vary significantly across the state. Because they are negotiated and managed between individual college faculty and district CTE directors and teachers – a time-consuming and costly process – these agreements result in duplicative costs for the system.

SBCTC maintains a database of most existing agreements, but there is little funding available to expand them. In addition, the state as a whole lacks a mechanism to develop statewide articulation agreements for CTE that could serve many districts and colleges more efficiently. A statewide approach to articulation could increase the number of dual credit opportunities for students and reduce the administrative costs to school districts and colleges.

Students experience difficulties obtaining dual credit

Although state law requires schools and colleges to work together to develop a seamless transition into higher education for students across the state, school districts and OSPI officials said this does not happen consistently. Even when articulation agreements are established, high school students do not always receive equivalent college credit for the specific CTE course taken. Instead, the student might only receive an elective credit if he or she moves or chooses to attend another college. This can result in students taking additional college-level courses to make up credits, adding to the cost and time needed to complete their postsecondary CTE program.

Fewer articulation agreements may have led to fewer dual-credit opportunities for students

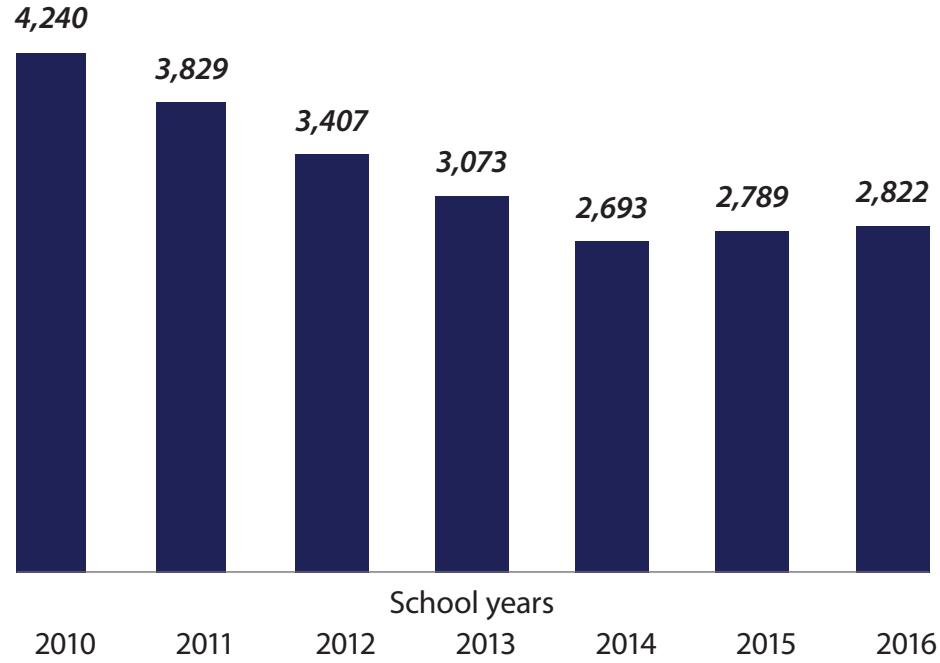
SBCTC's Statewide Enrollment and Reporting System (SERS; see sidebar) database, which captures most of the state's active articulation agreements, shows the number of agreements has dropped from just over 4,200 in the 2010 school year to about 2,800 in the 2016 school year. **Exhibit 10** (on the following page) illustrates a 33 percent decline over this seven-year period.

The SERS database

SBCTC maintains a searchable database of most individual articulation agreements. This database is called the Statewide Enrollment and Reporting System (SERS). It can be accessed by staff, teachers, students and others. Thirty of the state's 34 colleges enter articulation agreement data in SERS.

Exhibit 10 – The number of articulation agreements in Washington has declined from the 2010 school year

Limited to agreements with students enrolled, 2010-2016 school years



Note: Data is limited to the 30 colleges that record articulation agreements in SERS. We did not audit the accuracy or completeness of the SERS database.

Data source: SBCTC's SERS system.

Two factors make maintaining and expanding articulation agreements challenging.

1. **Loss of Tech-Prep funding.** The Tech-Prep program is part of the Carl D. Perkins CTE Act of 2006. Until the funding was discontinued in 2011, districts and colleges nationwide used Tech-Prep funding to pay for the staff time needed to negotiate articulation agreements. OSPI officials said the loss of Tech-Prep funding, which amounted to $2 million a year in Washington, contributed to the drop in articulation agreements. The Legislature has not compensated for this loss by adding or redirecting other funding.
   Interviews with school district CTE directors, agency staff and colleges revealed that having strong CTE leadership positions to build close relationships between college faculty and school districts was important to establishing and maintaining articulation agreements. However, the loss of Tech-Prep funding has made it less likely a district can pay for these types of positions.
2. **Long distances between districts and colleges.** SBCTC said colleges are required by law to focus on schools in their local communities. Even without this requirement, long distances between colleges and districts might impede the establishment and maintenance of articulation agreements. For example, the University of Alaska recently found that rural districts are less likely to have active articulation agreements than urban districts.

OSPI and SBCTC acknowledged in the CCSSO Assessment that they need to better integrate secondary programs with postsecondary programs so the CTE courses students take build on one another. State agencies have long recognized the benefits of this integration. In response to the elimination of Tech-Prep funding in 2011, the Workforce Board worked with SBCTC and OSPI to develop statewide model programs of study and articulation agreements for four industry clusters: agriculture, allied health, information technology and aerospace and manufacturing. Anticipated benefits included more dual-credit opportunities for students across the state, and less time and labor needed to craft individual articulation agreements. Ultimately, none of the statewide articulation agreements were completed for the four industry clusters. Detailed reasons for this lack of success are not clear, but Workforce Board minutes from the time say faculty time and financial support were the challenges.

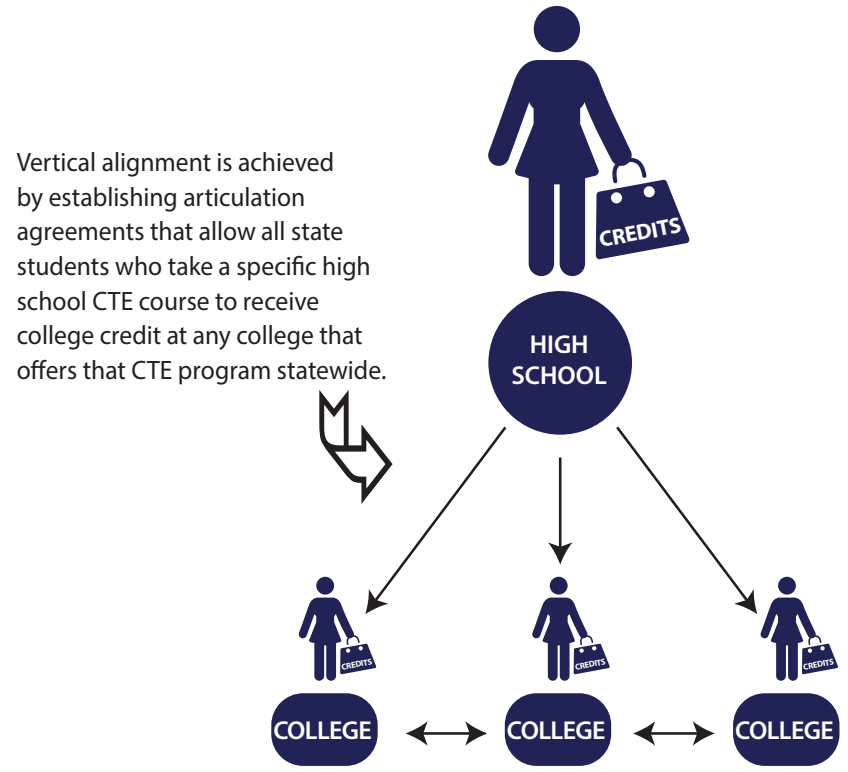
Statewide articulation and common course numbering can help students transfer credits from secondary to postsecondary schooling

Educational experts point to articulation as a way to maximize students' dual-credit opportunities. Industry literature recognizes two key leading practices that can help students transfer credits from secondary to postsecondary education:

- Statewide articulation agreements
- Common course numbering

The benefit to students of these practices is a virtually seamless transition from a high school CTE course to the related program at any college in the state system without losing any of the dual credits already earned. **Exhibit 11** illustrates the portability of credits.

Exhibit 11 – Portable credits help students carry high school credits into college



Vertical alignment is achieved by establishing articulation agreements that allow all state students who take a specific high school CTE course to receive college credit at any college that offers that CTE program statewide.

Horizontal alignment is achieved by aligning courses between different colleges, using common course numbering to easily transfer credits between colleges.

Ohio's statewide articulation agreements help high school students earn college credit

Ohio is an example of a state that has implemented statewide articulation. Ohio uses statewide articulation agreements to maximize dual-credit opportunities through a more consistent, transparent and efficient process in which every student can transfer CTE credit to any college in the state. The state began by focusing on the most common CTE courses with curricula that could be tied to nationally recognized industry credentials in fields such as nursing, welding and automotive repair. To identify specific employers' needs, Ohio solicits industry input and builds these technical skills into CTE curricula requirements.

Ohio has articulated more than 100 CTE courses across more than 30 CTE programs, benefiting the state's colleges, school districts and students. Most of these courses are used by at least seven colleges, some by more than 20. The state has used Perkins Act funding to partly pay for the statewide articulation project.

For CTE courses that are not common across the state's college system and thus not subject to statewide articulation agreements, Ohio allows districts and colleges to independently enter into one on one articulation agreements. However, they must use state-issued guidance to develop articulation agreements at the local level to ensure consistency.

Common course numbering allows students to transfer credits more easily

Other states use common course numbering to achieve horizontal alignment at the college level. Common course numbering, along with statewide articulation, allows colleges to evaluate one another's courses and helps students transfer credits between institutions seamlessly. The following practices helped Ohio and Colorado achieve horizontal alignment:

- **Legislation in Ohio requires a common course numbering system** that helps vertical and horizontal transfer of credits for Ohio's common CTE courses. The procedures and policies in Ohio have given high school students access to a large number of postsecondary CTE credits statewide.
- **Colorado uses consistent course numbering for the most common college programs** to help transfer credits. Colorado's Community College System has applied common CTE course numbering across most of the state's 13 colleges. This horizontal alignment is intended to allow students to transfer high school or college credits more easily to any college in the system.

Common CTE course numbering in Washington

SBCTC recently put a new online process in place that makes it easier for two or more colleges to voluntarily establish common CTE course numbering. SBCTC said that as of September 2017, there are 65 professional-technical common courses with more in development. These efforts should complement the common course numbering that will be needed if Washington moves to statewide articulation agreements.

Statewide articulation could bring benefits and savings to the state but will require cooperation between agencies

The benefits of targeted, statewide articulation agreements are clear to many stakeholders. While SBCTC officials supported statewide articulation, they noted agreements should be limited to courses that have a good return on investment, such as those that are common across the college system. They also said that statewide articulation should be initiated on a pilot basis with additional funding. Workforce Board indicated that legislative changes are needed to require the cooperation that is necessary for statewide articulation.

An opportunity for statewide articulation in aerospace

Washington's 10 Centers of Excellence focus on developing curricula and training related to industry sectors that are recognized as strategic to the state's economic competitiveness. Their courses are intended to help the college system operate more efficiently and effectively to provide students with the relevant skills needed for jobs in those industries.

The Director at the Center of Excellence for Aerospace and Advanced Manufacturing in Everett told us the Center works with Boeing to create curriculum that meets the needs of Boeing and company suppliers, explaining the importance of standardized assessments that demonstrate the skills students learn meet industry requirements. The Director also noted the potential for establishing a statewide articulation agreement for aerospace, once benchmarks for industry skills are fully established.

The decentralized approach districts and colleges take in establishing articulation agreements results in duplicative costs. This is one reason why Ohio has pursued statewide articulation. These individual negotiations require college and district staff time, costs that could be reduced across the state's education system if the efforts were pooled.

An example of regional articulation: Pierce County Careers Connection

To avoid duplicative costs, Pierce County school districts and colleges developed a consortium – the Pierce County Careers Connection (PC3) – to articulate CTE courses in a pooled manner. The consortium includes 16 school districts, three colleges and four skill centers, a few of which are outside the Pierce county line.

As of January 2017, PC3 has 113 articulation agreements that are available for use by every member of the consortium. Based on the time and costs the PC3 administrator said were needed to develop a typical articulation agreement, the total cost of negotiating all 113 agreements are an estimated $196,000 (see **Exhibit 12**, and Appendix B for information about the methodology behind all these calculations).

Exhibit 12 – Estimated cost to negotiate one PC3 articulation agreement

40 hours (20 each for high school and college teachers)

at $43.35 an hour

= $1,734 / agreement

To negotiate **all 113** PC3 agreements currently in use **cost about $196,000**

(See Appendix B for our assumptions and methodology.)

If each member of the consortium had to negotiate each of the articulation agreements that they used individually, consortium members would have spent approximately $1.2 million more, including an additional 27,600 hours of staff time, to achieve the same level of articulation they have under the umbrella of PC3, shown in **Exhibit 13**.

Exhibit 13 – Regional articulation agreements in Pierce County likely saved more than $1 million in labor costs

Estimates based on PC3 articulation agreements for 2016

Potential costs savings for PC3 participants...	Additional uses of agreements	Estimated savings
Based on number of times PC3 pooled agreements are currently used	690	$1.2 million
Return on investment estimated for **each** pooled articulation agreement		$10,404

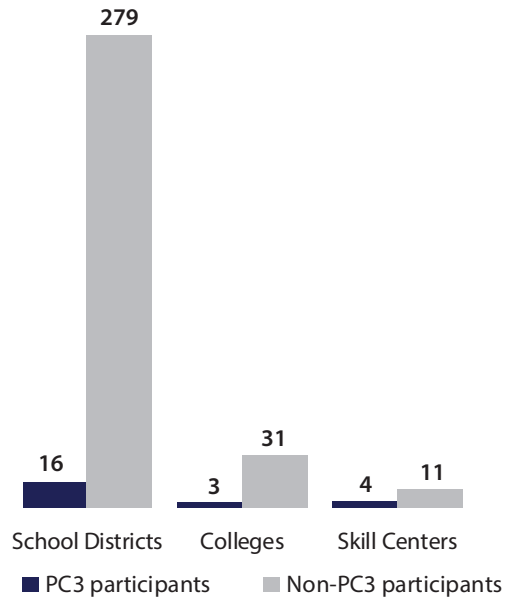
Note: Data provided by PC3 administrator and SERS for these calculations was unaudited.
Data source: PC3 administrator, Student Enrollment Reporting System [SERS], U.S Department of Labor.

Statewide articulation agreements for courses with the highest return on investment could offer even greater savings because they could be distributed across the state's entire education system. **Exhibit 14** illustrates the number of additional school districts, colleges and skill centers that could benefit from statewide articulation.

Because the state relies mostly on articulation agreements negotiated between one college and one district, rather than using statewide articulation where it is cost-effective, school district and college resources are strained and fewer student pathways achieved. Statewide articulation could lower costs, provide greater opportunities for students across the state, and provide more consistent and equitable access to these pathways.

Exhibit 14 – Opportunity for savings through statewide articulation

Based on 295 school districts, 34 colleges, 15 skill centers



Data source: PC3 administrator, OSPI and SBCTC.

The state must determine how to pay for statewide articulation efforts in the face of reduced funding

Shifting from individual articulation agreements to statewide agreements should eventually reduce costs across the entire CTE system. However, Workforce Board, OSPI and SBCTC will have additional demands placed on their resources to achieve statewide articulation, as will district and college faculty who work on these agreements. Once the costs of these agency, district and college efforts are calculated, the Legislature will need to decide how to fund them. After statewide articulation is established and is achieving system savings, the Legislature will need to decide where to invest these funds.

A legislatively mandated workgroup could help establish statewide articulation agreements that incorporate common course numbering

Agencies, colleges and districts that administer Washington's CTE programs lack the statutory authority to require cooperation from one another, which has resulted in a fragmented CTE system. This is partly because no one group is responsible for system oversight. Many of the difficulties districts and colleges face in developing articulation agreements are exacerbated by this lack of coordination. A legislatively mandated workgroup, led by Workforce Board, including representatives from OSPI and SBCTC and aided by district and college faculty, could achieve the coordination needed to establish statewide articulation agreements. These agreements should incorporate common course numbering and lead to dual credit for use by all school districts and colleges. This workgroup would be accountable to the Legislature.

Workforce Board already has these significant statutory roles (see Appendix C):

- Provides for coordination among the different agencies that administer CTE
- Performs a biennial assessment of the vocational education needs and assesses the extent to which vocational education along with employment, training, and basic education services represent a consistent, integrated approach to meet such needs
- Facilitates the transfer of credit policies and encourages articulation agreements between secondary and postsecondary CTE programs

It is due to these statutory roles that Workforce Board is well positioned to serve as the lead agency over the workgroup.

Conclusion

Stakeholders have identified a number of long-standing issues that continue to affect CTE delivery. As we talked to agencies, school districts, colleges and other stakeholders, a recurring observation emerged: a fragmented CTE system prevents the state from successfully addressing these issues, creating barriers for CTE students after high school. In the 2016 CCSSO Career Readiness Needs Assessment, OSPI, SBCTC and Workforce Board reached a similar conclusion.

The agencies that deliver, oversee and operate Washington's CTE programs do so with little coordination and are guided by statutes that lack clarity. The lack of coordination extends to school districts and colleges, making a student's secondary-to-postsecondary transition more difficult. Implementing the leading practices identified in this report can be more difficult when multiple agencies must work together – each with its own leadership, mission and funding – but lack the statutory authority to require cooperation.

Industry sources recognize it is a leading practice to coordinate a state's secondary and postsecondary CTE programs. Greater coordination should be supported by legislation that helps the two systems undertake the task of engaging with large or regional businesses to improve the relationship between employer needs and student learning, as well as leading the process of establishing statewide articulation agreements for CTE courses that are common across the college system and are easily tied to industry standards.

Consequently, we make recommendations to the Legislature, OSPI, Workforce Board and SBCTC that will clarify statutes and improve coordination, oversight and cooperation across Washington's career and technical education system. These recommendations should help improve career guidance for students, increase dual credit opportunities for college courses taken in high school, smooth secondary to postsecondary transitions and strengthen engagement with the state's business community.

Recommendations

We recommend the Legislature:

1. Require the Office of Superintendent of Public Instruction (OSPI) to work with the State Board of Education to establish a model course framework required for all students in the 7th or 8th grade that:
   a) Teaches students about multiple career paths that include postsecondary career and technical education (CTE), apprenticeships, military and four-year professional opportunities along with the educational costs and anticipated incomes that accompany each
   b) Informs students about dual-credit opportunities that exist within CTE programs
   c) Includes the development of students' High School and Beyond plans
   d) Incorporates the improved Career Bridge website or other comprehensive career guidance tools
2. Require the Workforce Board to establish a workgroup that is funded by the Legislature and consists of staff from the Workforce Board, OSPI and the State Board for Community and Technical Colleges (SBCTC). This workgroup should be responsible for establishing:
   a) A complete inventory of all active articulation agreements maintained in a centralized database, which must be used by all districts and colleges
   b) A list of all CTE programs across districts and colleges to help identify articulation opportunities
   c) Statewide articulation agreements for those courses offering a good return on investment that incorporate common course numbering and lead to dual credit for use by all school districts and colleges
   d) Standards identifying key elements required for all unique and statewide articulation agreements
   e) A structured process to increase regional coordination of secondary and postsecondary advisory committees to more effectively and efficiently engage employers
   f) A method to coordinate data sharing and analysis using:
      - Employment Security Department data on occupational wages and growth forecasts
      - Biennial business surveys conducted by the Workforce Board
      - Labor-market demand data collected by colleges and SBCTC that drives postsecondary CTE programs and courses
3. Once established, require the workgroup to:
   a) Define how to prioritize the establishment of new statewide articulation agreements. These agreements should:
      - Be implemented through a deliberative process between faculty in school districts and colleges
      - Begin with the most common CTE courses, including those with curricula that can be easily tied to nationally recognized industry standards

- Incorporate curricula that are established in partnership with the Centers of Excellence and businesses where applicable
- Require reviews at least once every three years to update the curricula

b) Develop and report performance measures to the Legislature that show:
- The increase in the number of CTE college paths (articulated dual credit courses multiplied by the number of colleges that accept them)
- Cost savings achieved across the secondary and postsecondary systems

4. Revise RCW Chapter 28A.700 to:
   a) Define the term "skills gap", as used in RCW 28A.700.010 (2)(a), which requires districts to demonstrate how their CTE plans helps address the skills gap. Clarifying this term would potentially affect how and the extent by which high-demand occupations drives CTE programming. This new definition should apply consistently across agencies.
   b) Define the term "high wage" as used in the definition of CTE (RCW 28A.700.010 (5)), which in part defines CTE as "a planned program of courses that enable options for students to obtain high-wage employment preparation." This new definition should apply consistently across agencies.
   c) Require districts to submit evidence of high local labor demand for existing CTE programs when OSPI reapproves them every five years

We recommend the Office of Superintendent of Public Instruction:

5. Communicate to school counselors annually the importance of discussing CTE and apprenticeship paths along with academic paths as part of each student's High School and Beyond Plan
6. Consistent with state law, work with the Workforce Board, Washington State Apprenticeship and Training Council, and SBCTC to establish a regularly updated list of high-demand CTE programs using the occupational demand data provided by Workforce Board
7. Consistent with state law, strengthen procedures and documentation requirements to assess whether CTE programs that districts propose or renew correspond with local high demand

We recommend the Workforce Board:

8. Gather input from OSPI and the State Board of Education to enhance the Career Bridge website. This website should include information about CTE and dual-credit opportunities in high school.

We recommend the State Board for Community and Technical Colleges:

9. Share with OSPI and the Workforce Board the labor market data and analysis that colleges and SBCTC consider when developing postsecondary CTE programs and courses

Agency Response

STATE OF WASHINGTON

December 14, 2017

The Honorable Pat McCarthy
Washington State Auditor
P.O. Box 40021
Olympia, WA 98504-0021

Dear Auditor McCarthy:

Thank you for the opportunity to review and respond to the State Auditor's Office (SAO) performance audit report on Leading Practices for the State's Secondary Career and Technical Education Programs. The State Board for Community and Technical Colleges (SBCTC) and the Workforce Training and Education Coordinating Board (Workforce Board) worked with the Office of Financial Management to provide this response.

We commend your staff for their efforts to evaluate our state's complex career and technical education (CTE) system and the report's emphasis on better aligning CTE courses more directly with high-wage, in-demand occupations.

We wholeheartedly agree that Washington students must be exposed early to a full range of career options — including well-paying careers that require more than a high school diploma but less than a bachelor's degree. As the report shows, Washington employers are struggling to find enough people to fill jobs that require such mid-level of education.

We also agree with the need to make better use of labor market data to guide high school CTE efforts, and to create seamless connections between high school and community and technical college programs. We support expanding dual-credit opportunities for CTE programs as well as strengthening and expanding local articulation agreements. Articulation agreements are formal agreements that provide a smooth transfer of credits to college programs. We also recognize the need to use sound data in determining the labor market value of particular CTE courses, and whether they should be expanded or reduced.

The SAO used readily available data crosswalks from the Economic Development and Employer Planning System (EDEPS). However, this system, which directly links any single CTE course to the outcomes from a small number of jobs, has significant limitations and can confound results. A better method is needed to provide accurate career guidance information.

For example, EDEPS shows only two occupations for the family and consumer sciences career cluster; both are at or above the bachelor's degree level. This suggests family and consumer sciences is a CTE course that leads to above-average wages. At the same time, data entry — the course group with the highest CTE enrollment in Washington schools — shows below average wages because it is linked solely to basic data entry jobs, despite computer skills being foundational for most modern occupations, including those at the highest wage levels.

We recommend further research and analysis that focuses on career pathways so students planning their future can more fully understand the potential labor market. Complementary analysis at the course level

should distinguish different "types" of CTE courses: separating career and education planning courses; distinguishing between exploratory and preparatory courses in programs of study; and identifying broadly applicable foundational skill courses while distinguishing those primarily applicable within technical education from those with general applicability to education.

The recommendations in your report align well with the mission and goals of the state strategic plan for workforce development — Talent and Prosperity for All (TAP). We invite the SAO to present its findings and recommendations to the Workforce Board, which oversees TAP implementation, and discuss potential strategies to advance recommendations.

With regard to legislative recommendation No. 2, we appreciate that you called upon the Legislature to fund the proposed work group. If funded, we ask that the Legislature consider the work, structure and relationships already established as it outlines the structure and responsibilities for the group.

The Workforce Board is the legislatively designated coordinating body for policy and strategy linking Washington's secondary and postsecondary education systems. For many years, the Workforce Board has advocated creating multiple pathways to economic self-sufficiency and engaged stakeholders in secondary and postsecondary education regarding articulation policy. The business- and labor-led Workforce Board is well situated to provide staff support and coordination for the work group.

The Office of Superintendent of Public Instruction (OSPI) and SBCTC, as governing bodies for high schools and colleges, are in a strong position to leverage partnerships and bring faculty together to forge successful articulation agreements. (The "Bridge to College" courses are a good example). Superintendent Reykdal and Executive Director Yoshiwara have already directed staff to develop a dual-credit pilot program that could be adopted by multiple districts and colleges. It is important to note that credit acceptance policy and curriculum rests with the colleges and their faculty according to accreditation standards spelled out by the Northwest Commission on Colleges and Universities. Articulation agreements cannot be mandated by the SBCTC, the Workforce Board or OSPI. That said, SBCTC has a proven track record in facilitating system-wide initiatives and has the trust, experience and understanding to navigate faculty and institutional roles.

We recommend starting with a smaller pilot project to identify barriers and opportunities. Creating a statewide articulation agreement and common course numbering among 30 community and technical college districts and 295 school districts — all governed by their own local boards of trustees — will be complex and time-consuming.

SBCTC and the colleges have a deep level of experience in engaging employers through program advisory committees, centers of excellence, job skills and customized training programs. More than 2,000 employers serve on program advisory committees.

We would be pleased to explore a more coordinated approach to advisory committees. Advisory committee structure is defined in statute (RCW 28B.50.252) and under SBCTC policies. Additionally, colleges have longstanding, effective advisory committees. Regional and combined advisory committees are permissible under SBCTC guidelines, but *requiring* a regional or statewide approach is unlikely to achieve the desired outcome as employers are often loyal to specific programs and institutions. Consideration can be given to increasing the presence of high school faculty on college advisory committees and vice versa, better coordination of employer engagement and regional entities, where warranted.

We also respectfully suggest that success would be better measured by including the number of students who articulate from high school CTE programs to college professional-technical programs, not solely by the number of articulation agreements that are in effect. Also, it would likely be impossible to measure success in terms of cost savings because of the complexity and time involved in designing robust articulation agreements.

Your report on the state's CTE system demonstrates opportunities to help ensure more students gain earlier access to career planning, a more unified and expanded range of high school-to-college dual credit opportunities, a renewed focus on engaging business to ensure coursework is current and connected to the real world, and more CTE courses that better align with the high-wage, high-demand jobs available in Washington.

SBCTC and the Workforce Board remain committed to working closely together — with OSPI — to expose students to the exciting array of career options before them and to supply the relevant, research-based programs to move them into those careers. With that in mind, we are providing the attached response to recommendations in the audit report.

Please extend our thanks to your staff for exploring innovative approaches here in Washington and in other states and for gathering numerous perspectives for this report.

Sincerely,

Jan Yoshiwara
Executive Director
State Board for Community and Technical Colleges

Eleni Papadakis
Executive Director
Workforce Training and Education Coordinating Board

David Schumacher
Director
Office of Financial Management

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Tammy Firkins, Performance Audit Liaison, Results Washington, Office of the Governor
Nancy Dick, Director of Workforce Education, State Board for Community and Technical Colleges
Dave Pavelchek, Deputy Director, Workforce Training and Education Coordinating Board

OFFICIAL STATE AGENCY RESPONSE TO PERFORMANCE AUDIT ON LEADING PRACTICES FOR THE STATE'S SECONDARY CAREER AND TECHNICAL EDUCATION PROGRAMS DECEMBER 14, 2017

This coordinated management response to the State Auditor's Office (SAO) performance audit report received November 21, 2017, is provided by the Office of Financial Management, the State Board for Community and Technical Colleges and the Workforce Training and Education Coordinating Board (Workforce Board).

SAO PERFORMANCE AUDIT OBJECTIVES:

The SAO designed the audit to identify school districts that are providing effective Career and Technical Education (CTE) programs that meet the needs of students and employers and develop a set of leading practices that may be useful to other districts across the state. It asked:

1. Are secondary CTE programs and courses aligned with the needs of students and employers?
2. Are there leading practices that could improve the success of the state's secondary CTE programs?

SAO found the following conditions that could improve the alignment between the courses students that are offered in secondary CTE programs and job opportunities:

1. Improving career guidance given to students and providing it in a classroom setting in the seventh or eighth grade.
2. Strengthening employer engagement could better align CTE programs and courses with high-wage industry-needed skills.
3. Updating the list of high-demand programs, strengthening the review of local labor demand data and clarifying laws may help reduce the skills gap.
4. Expanding the number of CTE dual-credit opportunities to increase the number of pathways from high school to college.

SAO directs recommendations 1-4 to the Legislature and 5-7 to the Office of Superintendent of Public Instruction (OSPI).

SAO Recommendation 8 to the Workforce Board: Gather input from OSPI and the State Board of Education to enhance the Career Bridge website. This website should include information about CTE and dual-credit opportunities in high school.

STATE RESPONSE: The Workforce Board agrees with the recommendation and will gather input from OSPI and the State Board of Education on improving the Career Bridge site. We agree with the report's emphasis on Career Bridge as a useful tool for career and education planning for students. The Workforce Board has been working on creating new components to Career Bridge that demonstrate the value of secondary career and technical education as well as developing concepts such as a digital portfolio, where students can save their resumes and letters of recommendation, along with other career-connected learning efforts. These features would make the site much more valuable for middle and high school students.

The Workforce Board also will reach out to OSPI and the State Board of Education to retrieve data on dual-credit opportunities and CTE. This will take place on a regular basis once information is available and contingent on additional funding to support the creation and maintenance of additional webpages on Career Bridge.

The Workforce Board is also interested in working with its stakeholders on other resource and revenue models for Career Bridge. Currently, Career Bridge does not have a sustained or predictable funding source.

Action Steps and Time Frame

- The Workforce Board will consult with OSPI and the State Board of Education for feedback about ongoing efforts to make Career Bridge a more useful tool for students. *By March 31, 2018.*

SAO Recommendation 9 to the State Board for Community and Technical Colleges (SBCTC): Share with OSPI and the Workforce Board the labor market data and analysis that colleges and SBCTC consider when developing postsecondary CTE programs and courses.

STATE RESPONSE: The State Board for Community and Technical Colleges agrees with the recommendation. Due to the large number of programs, it is not practical to share program-specific data. We will share tools and processes used by the community and technical colleges when developing postsecondary CTE programs and courses.

Action Steps and Time Frame

- SBCTC will share with OSPI and the Workforce Board the labor market data tools and professional-technical program approval process used by community and technical colleges when developing postsecondary CTE programs and courses. *By March 1, 2018.*

SUPERINTENDENT OF PUBLIC INSTRUCTION

Chris Reykdal Old Capitol Building · PO BOX 47200 · Olympia, WA 98504-7200 · http://www.k12.wa.us

December 14, 2017

The Honorable Pat McCarthy
Washington State Auditor
P.O. Box 40021
Olympia, WA 98504-0021

Dear Auditor McCarthy:

I have received and reviewed the State Auditor's Office performance audit report on Leading Practices for the State's Secondary Career and Technical Education Programs, and appreciate the opportunity to provide a response. On behalf of our Career and Technical Education department, please share our appreciation for your staff's willingness to engage in dialogue and attempt to understand the systems, structure, and policy that guide CTE programs. We also appreciate your recognition of the challenges of creating recommendations that reflect secondary CTE delivery through the K-12 system in a local control state.

We agree that the role a counselor plays in the school system is critical, and appreciate that you called attention to our state's students-to-counselor ratio being double the ratio recommended by the American School Counselor Association. As reflected in our 2018 supplemental budget request related to High School and Beyond Plans, our agency is requesting an increase in funding for middle school counselors, support for the development of counseling resources, and professional development funds. If a middle school career exploration course were pursued, our office would collaborate to create a model course framework as an option for school districts. Eventually, a law would need to be amended to allow for a non-STEM CTE funded course to be offered at the middle school level.

Our agency has consistently supported Career Bridge as a useful tool for school district use, and look forward to providing feedback for improvements. The lack of an updated statewide high demand list was an oversight, which can be corrected and maintained with cooperation from our partners at the Workforce Training and Education Coordinating Board, Washington State Apprenticeship and Training Council, and the State Board for Community and Technical Colleges. Once updated, this resource will be provided to districts and be used to inform decision making at our agency.

We also agree that the role a district advisory committee plays is critical. Both federal Perkins and state law require annual evaluations of CTE programs, but the potential engagement of our business partners surpasses the legal requirements. Many districts have combined efforts to create consortium or regional based advisory groups, and we are looking forward to gauging school district interest and investigating the benefits of shared advisory committees with community and technical college partners. It is common for secondary CTE programs to have both general and program specific advisory committees. In areas of shared programs, we can seek structures that will enable us better to respect the time of our industry partners.

I believe in the importance of making data driven decisions. We believe that the course area data, when cross walked with Economic Development and Employer Planning System (EDEPS) occupational groupings, does not provide the most reliable narrative of our state's offerings. For example, Family & Consumer Sciences is a program area in our state, not a single course area. There are more than 30 unique Classifications of Instructional Programs (CIP) codes that exist within Family and Consumer Science program offerings, with multiple course types within single CIP code areas. After the statewide high-demand list is re-established, we will be able to gather and analyze data that will provide a much more consistent reflection of CTE in Washington. This information will assist districts and state staff in making decisions related to course offerings.

The report suggests that course equivalencies may limit the alignment of CTE programs to high-wage, high-demand occupations. We would respectfully note the intent of course equivalencies is to increase academic rigor, and support student choice in achieving high school graduation. We believe course equivalencies play a critical role in our educational system, in service to our students, as achieving high school graduation is critical to all employment sectors. The opportunity for students to earn academic credit towards graduation through CTE courses that reflect their career pathways better prepares students to enter all post-secondary pathways. We need to expand statewide equivalencies beyond mathematics and science, produce supporting resources for implementation of course frameworks, and provide intentional professional development opportunities for CTE instructors.

I am committed to an educational system with multiple, high-quality pathways to graduation. CTE programs play a critical role in supporting graduation rates, increasing student engagement, and supporting career planning. Our system must support diverse pathways that reflect the many careers that require more than a high school diploma, but less than a baccalaureate degree. Students want to touch, create, develop, and learn by doing, opportunities that are prevalent in our CTE courses. To achieve multiple, valued pathways to graduation and eventual employment we need:

1. Robust programs of study that clearly articulate a sequence of courses for students to explore and prepare for employment, while developing an understanding of the training and education required to achieve their career goals.

2. An educational system that responds to student interest, allowing students to enter a pathways phase of education in the 11th and 12th grade. This requires increased utilization of statewide equivalency courses, enabling students to choose the courses that best support their interests and goals while earning academic credit through CTE coursework and supporting on-time high school graduation.

3. Increased dual credit opportunities for all students, and increased CTE dual credit opportunities in cooperation with SBCTC. Working towards creating statewide articulations and increasing models for articulation agreements will be accomplished with leadership within our systems, and most importantly through partnership of local LEA instructors and college faculty working together. SBCTC Executive Director Yoshiwara and I have requested support for a pilot program to help move the needle on this important work, and our staff are excited to continue this work.

4. Alignment of our education system to our workforce needs. This will require increasing opportunities through CTE, work-based learning, youth and adult apprenticeships and internships, and multiple pathways to successful employment. Early exposure to options, and informed students, parents, and school personnel to support preparing students for post-secondary success through academic pathways, technical pathways, youth apprenticeship, work-based learning, internships, and other innovations linking HSBP to direct instruction and/or employment.

We are proud of the current opportunities afforded our students throughout CTE programs in our state, and appreciate your staff took the time to engage with local school district personnel. OSPI welcomes the opportunity to reflect, and assess our current protocols and procedures related to CTE programs. Our staff is committed to continual advancement, and has already began systemically approaching coordinated efforts for improvement. We have begun the process to review longitudinal CIP code data to begin streamlining CIP codes, removing outdated and low or no-demand course areas, in addition to assessing current resources for improvement.

The original intention of this audit was to gather best practices from CTE programs to result in the creation of a resource toolkit to share across the state; this potential resource was of great interest to school districts and OSPI, and we would recommend consideration of completing this initial task. We are providing the attached response to the recommendations in the audit report, and welcome any further questions you may have.

Career and Technical Education is foundational to success in our school system and to our economy, and OSPI is committed to our role in this important work. We will continue to work in close partnership with the SBCTC and Workforce Boards, and appreciate your staff's attention to this important work.

Sincerely,

Chris Reykdal
Superintendent of
Public Instruction

OFFICE OF SUPERINTENDENT AND PUBLIC INSTRUCTION December 14, 2017

RESPONSE TO PERFORMANCE AUDIT OF LEADING PRACTICES FOR THE STATE'S SECONDARY CAREER AND TECHNICAL EDUCATION PROGRAMS

Report Received: November 21, 2017, updated December 7, 2017

SAO RECOMMENDATION 5 TO THE OFFICE OF SUPERINTENDENT OF PUBLIC INSTRUCTION:

Communicate to school counselors annually the importance of discussing CTE and apprenticeship paths along with academic paths as part of each student's High School and Beyond Plan.

OSPI RESPONSE:

The Office of Career and Technical Education (CTE) collaborates regularly with the Office of System and School Improvement (OSSI) to provide information and common messaging to our state's counselors. OSPI CTE staff presented at the 2017 Washington School Counselors Association (WSCA) conference, which provides the opportunity to elicit feedback and determine what school counselors need to support students' knowledge and pursuit of CTE opportunities.

Conversely, OSSI staff present at CTE conferences, including the summer and fall Washington Association of Career and Technical Educators (WA-ACTE) conferences and summits. Washington Career Counseling and Employment Readiness (WA-CCER) is a recognized membership section within WA-ACTE, and the spring Washington Association of Career and Technical Administrators (WACTA) will be offering professional development specifically for school counselors. We will continue to seek opportunities to assess and respond to needs identified by our counselors. We understand the school and guidance counseling model targets academic achievement, social emotional support, and career and college readiness to provide personalized planning for all students.

Should funds be appropriated to support RCW 28A.700.080, "Awareness campaign for career and technical education," OSPI could engage in a more formal campaign to "increase awareness among teachers, **counselors,** students, parents, principals, school administrators, and the general public about the opportunities offered by rigorous career and technical education programs." The law, enacted in 2008, specifically directs the campaign to include technical CTE guidance including information about career and technical education course equivalencies and dual credit for high school and college; and education, apprenticeship, and career opportunities in emerging and high-demand programs. Both of these directives align with the intended outcome of recommendation 5.

ACTION STEPS AND INTENDED TIME FRAME:

The OSPI CTE Department will continue to work in collaboration with OSSI staff to identify professional development and technical assistance opportunities for shared initiatives, and will present at the WSCA conference in March of 2018. OSSI staff will present at the WACTA spring conference in March of 2018, and the summer WA-ACTE conference in August of 2018. Staff will work together to assess resource needs and respond by creating high-quality and consistently-messaged communications for counselors and other interested school staff. If an awareness campaign is funded, staff will work with the communications department to create a campaign utilizing multiple communication strategy platforms.

SAO RECOMMENDATION 6 TO THE OFFICE OF SUPERINTENDENT OF PUBLIC INSTRUCTION:

Consistent with state law, work with the Workforce Board, Washington State Apprenticeship and Training Council, and SBCTC to establish a regularly updated list of high-demand CTE programs using the occupational demand data provided by Workforce Board.

OSPI RESPONSE:

We appreciate this recommendation calling our attention to the need to update the list of statewide high demand CTE programs. An updated list will enable our school districts, advisory committees, and state CTE office to make more informed decisions related to CTE programming and approval. To meet the law requirements, the high employer

demand programs of study list will be developed by the Workforce Board, to be considered in addition to the available high demand list maintained by the workforce development councils.

ACTION STEPS AND INTENDED TIME FRAME:

In alignment with RCW 28A.700.020, OSPI will work with the Workforce Board (WFB), Washington Apprenticeship and Training Council (WSATC), and State Board for Community and Technical Colleges (SBCTC) to develop the list, and create and communicate a process by March 1, 2018. OSPI will collaborate with the Workforce Board to develop the high employer demand programs of study list, which will enable OSPI to create the required high demand list by February 1, 2018.

Once the list has been drafted, reviewed, and finalized, OSPI will establish and communicate the appropriate process for local school districts to recommend additional programs consistent with the law. The process will include the submission of evidence of local demand, and reflect local program and general advisory committee review and recommendations. The process will include annual review and update timelines, to ensure proper maintenance and assistance to school districts. OSPI will provide technical assistance to school district personnel related to utilizing this resource, and requirements to amend the state list. Additional funding to increase the grant program outlined in RCW 28A.700.050, "Grants to develop or upgrade high-demand career and technical education programs," would enable districts to develop more high-demand programs. This grant program was initially funded in 2008, and the allocation for these grant funds has not increased since then.

SAO RECOMMENDATION 7 TO THE OFFICE OF SUPERINTENDENT OF PUBLIC INSTRUCTION:

Consistent with state law, strengthen procedures and documentation requirements to assess whether CTE programs that districts propose or renew correspond with local high demand.

OSPI RESPONSE:

RCW 28A.700.010 states CTE school district plans must, "Demonstrate how career and technical education programs will ensure academic rigor; align with the state's education reform requirements; help address the skills gap of Washington's economy; and maintain strong relationships with local career and technical education advisory councils for the design and delivery of career and technical education." We will continue seek ways to strengthen our procedures and documentation requirements, in part by elevating the important role that advisory committees play in the direction of CTE program offerings.

ACTION STEPS AND INTENDED TIME FRAME:

OSPI will establish a committee to create recommendations of improvement to strengthen the approval process for new and existing programs with committee recommendations made available to stakeholders for review and comment by July 2018. Based upon recommendations, CTE staff will work with Information Technology (IT) staff to create program work tickets to reflect technical changes to the re-approval and course approval system, and will communicate these expected changes to CTE directors by August 2018. IT staff will complete any required changes prior to the program re-approval window opening in January of 2019.

In the meantime, the new CTE program re-approval system is scheduled to launch February 1, 2018, and all CTE courses offered in all program areas will be submitted by districts during this launch year. This process will require districts to upload advisory minutes showing approval of the course including a narrative that demand was established. As we do not estimate that the high-demand list and required guidance will be established prior to this system launching, we will engage our stakeholders to recommend specific evidence that should be required to be uploaded in addition to advisory minutes in both the course approval and program re-approval system. Additionally, we believe that the streamlining of our CIP code chart, with better alignment to the national clusters will aid in the removal of no/low-demand CIP code offerings.

SAO RECOMMENDATIONS TO THE LEGISLATURE INVOLVING OSPI:

1. Require the Office of Superintendent of Public Instruction (OSPI) to work with the State Board of Education to establish a model course framework required for all students in the 7th or 8th grade that:
    a. Teaches students about multiple career paths that include postsecondary career and technical education (CTE), apprenticeships, military and four-year professional opportunities along with the educational costs and anticipated incomes that accompany each
    b. Informs students about dual-credit opportunities that exist within CTE programs
    c. Includes the development of students' High School and Beyond plans
    d. Incorporates the improved Career Bridge website or other comprehensive career guidance tools

OSPI RESPONSE:

We agree that the appropriate setting for career exploration is within the middle level grades to best inform a student's high school and beyond plan. With or without a legislative directive, OSPI will work to consolidate and provide information related to multiple career paths; post-secondary opportunities, in addition to dual credit opportunities; and the High School and Beyond Plan (HSBP) to school districts. OSPI can develop of a career exploration model framework without it being a middle school required class.

ACTION STEPS AND INTENDED TIME FRAME:

Consistent with SAO recommendation 8 to the Workforce Board, OSPI will provide feedback related to the Career Bridge website when requested, and in alignment with the WFB goal of March 31, 2018. If legislative action is taken, OSPI will consult with stakeholders and internal and external partners to respond to the legislature's request.

2. Require the Workforce Board to establish a workgroup that is funded by the Legislature and consists of staff from the Workforce Board, OSPI and the State Board for Community and Technical Colleges (SBCTC). This workgroup should be responsible for establishing:
    a. A complete inventory of all active articulation agreements maintained in a centralized database, which must be used by all districts and colleges
    b. A list of all CTE programs across districts and colleges to help identify articulation opportunities
    c. Statewide articulation agreements for those courses offering a good return on investment that incorporate common course numbering and lead to dual credit for use by all school districts and colleges
    d. Standards identifying key elements required for all unique and statewide articulation agreements
    e. A structured process to increase regional coordination of secondary and postsecondary advisory committees to more effectively and efficiently engage employers
    f. A method to coordinate data sharing and analysis using:
        - Employment Security data on occupational wages and growth forecasts
        - Biennial business surveys conducted by the Workforce Board
        - Labor-market demand data collected by colleges and SBCTC that drives postsecondary CTE programs and courses

OSPI RESPONSE:

OSPI will continue working with the SBCTC to maximize articulation agreements, and establish and communicate best practices and processes to share statewide. Funding to support the OSPI/SBCTC initiatives would help both agencies to proceed with this important work. We believe we can accomplish this task without burdening the WFB with the task of facilitating the workgroup.

Appendix A: Initiative 900

Initiative 900, approved by Washington voters in 2005 and enacted into state law in 2006, authorized the State Auditor's Office to conduct independent, comprehensive performance audits of state and local governments. Specifically, the law directs the Auditor's Office to "review and analyze the economy, efficiency, and effectiveness of the policies, management, fiscal affairs, and operations of state and local governments, agencies, programs, and accounts." Performance audits are to be conducted according to U.S. Government Accountability Office government auditing standards.

In addition, the law identifies nine elements that are to be considered within the scope of each performance audit. The State Auditor's Office evaluates the relevance of all nine elements to each audit. The table below indicates which elements are addressed in the audit. Specific issues are discussed in the Audit Results section of this report.

I-900 element		Addressed in the audit
1.	Identify cost savings	**Yes.** Although the audit did not quantify the savings, it concludes that statewide articulation agreements can replace some of the many one-on-one agreements that are made between individual districts and colleges.
2.	Identify services that can be reduced or eliminated	**No.** The audit focused on leading practices the state can use to improve the CTE programs. Consequently, it did not identify services that can be reduced or eliminated.
3.	Identify programs or services that can be transferred to the private sector	**No.** The audit focused on leading practices the state can use to improve the CTE programs. Consequently, it did not identify services that can be transferred to the private sector.
4.	Analyze gaps or overlaps in programs or services and provide recommendations to correct them	**Yes.** The audit found that OSPI and SBCTC can do more to coordinate between the secondary and postsecondary educational systems to improve CTE outcomes. Establishing statewide articulation agreements for the most common CTE programs and courses would replace some of the numerous individual agreements. The audit also found that OSPI can better assess whether district CTE programs align with high-wage, high- or stable-demand occupations.
5.	Assess feasibility of pooling information technology systems within the department	**No.** However, the audit recommends that all districts and colleges report their articulation agreements in a centralized system so that the state can better manage articulation agreements.
6.	Analyze departmental roles and functions, and provide recommendations to change or eliminate them	**Yes.** The audit analyzed the roles and responsibilities of OSPI, SBCTC, Workforce Board, and State Board of Education and identified ways they could work together to use leading practices to improve the state's CTE programs.
7.	Provide recommendations for statutory or regulatory changes that may be necessary for the department to properly carry out its functions	**Yes.** The audit recommends that the Legislature establish a workgroup comprised of members from Workforce Board, OSPI and SBCTC to improve CTE program outcomes. It also recommends the Legislature clarify certain statutes related to the state's secondary CTE program requirements.

I-900 element	Addressed in the audit
8. Analyze departmental performance data, performance measures and self-assessment systems	**Yes.** The audit determined that the use of specific performance measurements would improve the state's secondary CTE system. For example, to assess the benefits of statewide articulation efforts, the audit recommends that Workforce Board, OSPI and SBCTC establish performance measures to determine: • The increase in the number of college pathways (dual credit courses times the number of colleges that accept them) • Cost savings achieved across the entire K-14 system The audit also recommends that Workforce Board, OSPI, and SBCTC regularly engage employers to assess whether the state's CTE programs are providing employers with the skills and qualifications they need so they can adjust and improve the CTE programs and courses they offer.
9. Identify relevant best practices	**Yes.** The audit identified leading practices used in other states to improve CTE outcomes in our state.

Appendix B: Methodology

Methodology contents ..... page

Comparing the alignment between high school CTE course enrollment and occupations with high-growth forecasts

To compare CTE course enrollment with occupation forecasts, we used a crosswalk from the Economic Development and Employer Planning System (EDEPS; see the sidebar for a link to the definitions used in the crosswalk).

For more information about the crosswalk we used, including the definitions of units of analysis, see the EDEPS websites: http://www.edeps.org/SelectUA.aspx?st=ZZ

Consistent with determinations by the National Research Center for Career and Technical Education, we excluded courses that did not appear to align with a particular occupation (14 percent), as well as courses with low student enrollments that lacked a designation in the EDEPS crosswalk (2 percent). The excluded courses made up about 16 percent of all CTE courses taken by Washington high school students in 2015. The National Research Center determined many of these courses fit into a category of Classification of Instructional Programs (CIP) codes called "Basic Skills." The National Research Center excluded such courses in the Center's CIP code validation project, concluding that they are not academic or occupationally specific and do not provide transferable credit. Examples include independent living, personal choices and interpersonal relationships.

We reviewed the remaining 84 percent of CTE courses (including those at skill centers) offered to Washington students in grades 9 through 12 during the 2015 school year, comparing them to 10-year state occupation projections made by the Employment Security Department (ESD). The EDEPS crosswalk was used to assess how well these courses align with the high-demand requirement established in RCW 28A.700.020 (see Appendix C). This crosswalk is recognized as valid by the Perkins Collaborative Research Network.

We also compared these CTE courses to average annual job growth and in-state wage information from ESD and the U.S. Bureau of Labor Statistics using CIP codes and Standard Occupational Classification (SOC) codes. For the in-state wage information, this audit defined high-wage as higher than the average state wage of $54,000, since RCW 28A.700.010 (5) does not define high-wage.

For a full list of relevant CIP codes, see Appendix I; for a list of relevant SOC codes, see Appendix J

For each occupation, the ESD projections show average annual job growth from 2014 to 2019 and from 2019 to 2024. Annual job growth for these occupations includes newly created positions as well as job openings resulting from vacancies or churn. Average wages are weighted by the total employment of each occupation within each unit of analysis. The wage estimates used in this audit lacked information for a small portion of the occupations that were included in the analysis. This affected 2,846 student enrollments (1.01 percent of total enrollments from the final analysis) and around 0.36 percent of the average annual growth projections used for comparison. ESD explains in the wage file that certain occupations are suppressed for various reasons. (See the sidebar for a link to ESD website.)

To see more about how ESD estimates occupational employment wages and why some wage data is suppressed, see: https://fortress.wa.gov/esd/employmentdata/docs/occupational-reports/2016-oes-databook_online.xlsx

To assess course enrollment, we counted students once for each unique CTE course they took in 2015, regardless of duration. For example, if a student enrolled in two agriculture courses over two semesters, and a photography course for one semester, they would be counted three times (once for each unique course).

This method counts each unique CTE enrollment the same way across all students and school districts, regardless of the actual course duration. Ideally, we would have counted the number of hours that students were enrolled in a course, but this information was not accessible.

Leading practices in statewide CTE articulation and case study selection criteria

The literature about CTE described statewide secondary to postsecondary articulation agreements as a promising practice that could replace the numerous individual agreements created between different high schools and community colleges throughout a state. The literature highlights both benefits and challenges states face in their efforts to implement statewide articulation.

When we attempted to compare articulation practices across states, we found state education websites and the Association of Career and Technical Education's database on state articulation practices were often incomplete, outdated and unreliable. Specifically, the term "statewide articulation" was used inconsistently, often referred to horizontal (college-to-college) articulation rather than secondary to postsecondary articulation. Reliably identifying all states with statewide articulation would have required us to interview CTE administrators in every state. Instead, we adapted the selection criteria to identify states with well developed and documented processes which could provide a high level of detail, serving as case studies related to implementing statewide articulation. While none of the states we reviewed has a CTE governance structure identical to Washington's, two states, Ohio and Colorado, have well documented processes that could be useful to policy makers and CTE administrators in Washington.

Calculations used to evaluate the costs and benefits of the Pierce County Careers Consortium (PC3)

To assess the costs and benefits of the pooled articulation agreements negotiated within the consortium and used by its 23 members (16 school districts, four skill centers and three colleges), data was assembled from several sources. We did not independently audit any of the numbers provided.

Source	Calculation methods	Estimates
PC3 administrator	An estimate of the time needed to develop and negotiate a typical articulation agreement between a school district and a college	About 40 hours, distributed equally between district and college faculty
	The number of current articulation agreements in use by PC3 members	113 agreements
	The number of school districts and skill centers that are members of PC3	20
U.S. Department of Labor	Average hourly wage and benefits information about such employees	Average wage plus 50% for benefits = $43.35
Student Enrollment Reporting System [SERS] maintained by SBCTC	The number of unique and active articulation records for PC3 agreements identified in our analysis of SERS data	803

To estimate PC3's costs for current agreements, we performed these calculations:

Typical cost to negotiate an articulation agreement	Time and wages	Number of agreements	Estimated costs
Hours per negotiation (20 for secondary, 20 for postsecondary)	40 hours		
Average hourly wage (1 CTE secondary teacher, 1 CTE college professor)	$43.35		
Average cost per articulation agreement	40 x $43.35	x 1	$1,734
Number and cost for all PC3 articulation agreements	**$1,734**	**x 113**	**$195,942**

We estimated what the costs to PC3 members would be without the 113 pooled articulation agreements, which are currently used 803 times by PC3 members, at about $1.2 million.

Finally, to calculate potential benefits in cost avoidance to PC3 participants, we multiplied the number of additional uses of agreements by the average cost for each articulation agreement.

Potential cost savings for PC3 participants by using pooled articulation agreements	Additional uses of agreements	Estimated costs avoided
Based on number of times PC3 pooled agreements are currently used	690	$1.2 million
Return on investment estimated for each pooled articulation agreement		**$10,404**

We also calculated the return on investment for each articulation agreement by dividing the number of uses by the number of agreements (803/113 = 7). This shows that PC3 participants use each of the 113 agreements an average of seven times. We then multiplied the average additional number of times each PC3 agreement is used (7-1 = 6) by the cost for each agreement ($1,734), which comes to $10,404.

List of CTE-related publications and resources

The following is a partial list of publications and resources which helped provide background for this audit. Many of these publications provide more detail about the current and leading practices discussed in the report and may be useful to a variety of CTE stakeholders.

A Look Inside: A Synopsis of CTE Trends. A Four-Part Series Analyzing State CTE Data and Initiatives. Focus: Governance. National Association of State Directors of Career Technical Education. https://careertech.org/sites/default/files/SynopsisofCTETrends-Governance-2012.pdf

Career Academies: Long-Term Impacts on Labor Market Outcomes, Educational Attainment, and Transition to Adulthood. Manpower Demonstration Research Corporation. http://www.mdrc.org/sites/default/files/full_50.pdf

Career Readiness Initiative Needs Assessment Framework. Advance CTE, CCSSO, Education Strategy Group. http://www.ccsso.org/Documents/2016/CRI%20State%20Team%20Needs%20Assessment%20Framework_4%2027%2016_FINAL.pdf

How Career and Technical Education Can Help Students Be College and Career Ready: A Primer. American Institutes for Research. http://www.aypf.org/wp-content/uploads/2013/04/CCRS-CTE-Primer-2013.pdf

Investing in America's Future: A Blueprint for Transforming CTE. U.S Department of Education. https://www2.ed.gov/about/offices/list/ovae/pi/cte/transforming-career-technical-education.pdf

Opportunities and Options: Making Career Preparation Work for Students. Council of Chief State School Officers. http://www.careertech.org/sites/default/files/CCSSOTaskForceCareerReadiness120114.pdf

Pathways to Great Jobs in Washington State. Washington Round Table and Boston Consulting Group. http://www.waroundtable.com/wp-content/uploads/2017/03/WKWJ_FINAL_Report.pdf

Preventable Failure: Improvements in Long-Term Outcomes when Schools Focused on the Ninth Grade Year. University of Chicago Consortium on Chicago School Research. http://files.eric.ed.gov/fulltext/ED553174.pdf

Seizing the Future: How Ohio's CTE Programs Fuse Academic Rigor and Real-World Experiences to Prepare Students for College and Careers. Achieve. http://www.achieve.org/files/Achieve_OHcareerTech.pdf

Six Stories about Six States: Programs of Study. National Research Center for Career and Technical Education. http://www.nrccte.org/resources/publications/six-stories-about-six-states-programs-study

State Strategies for Financing CTE. U.S Department of Education. http://ctecenter.ed.gov/files/NCICTE_CTE_Finance_Study_Final_508.pdf

Strengthening Transitions by Encouraging Career Pathways: A Look at State Policies and Practices. Community College Research Center, Columbia University. http://ccrc.tc.columbia.edu/media/k2/attachments/strengthening-transitions-career-pathways.pdf

The Pathways to Prosperity Network: A State Progress Report. Harvard Graduate School of Education, Jobs For The Future. http://www.jff.org/sites/default/files/publications/materials/Pathways-to-Prosperity-for-Americas-youth-080514.pdf

Policy Benchmark Tool: CTE Program of Study Approval. Advance CTE. https://cte.careertech.org/sites/default/files/files/resources/Program_Approval_Benchmark_Tool_2017.pdf

The Promise of High Quality Career and Technical Education: Improving Outcomes for Students, Firms, and the Economy. The College Board, Georgetown Public Policy Institute, Georgetown Center on Poverty, Inequality and Public Policy and the Business Roundtable. http://sdlcillinois.org/constitution/georgetown.pdf

The State of Career Technical Education: Increasing Access to Industry Experts in High Schools. CCSSO, Advance CTE and New Skills for Youth. https://cte.careertech.org/sites/default/files/files/resources/State_of_CTE_Industry_Experts_2016_0.pdf

Transforming Career Counseling: Bridging School to Career in the Workforce of the Future. Manufacturing Skills Standards Council. https://www.sme.org/uploadedFiles/About_SME/Industry_Focus_Areas/WFD/Career_Counseling_White_Paper.pdf

Work-Based Learning to Expand Jobs and Occupational Qualifications for Youth. Center on Budget and Policy. https://www.cbpp.org/sites/default/files/atoms/files/4-2-14fe-holzer.pdf

Washington State Publications and Resources

Career Guidance Washington-Handbook Guide. OSPI. http://www.k12.wa.us/SecondaryEducation/CareerCollegeReadiness/pubdocs/HandbookCareerGuidanceWashington.pdf

CTE Program Standards. OSPI. http://www.k12.wa.us/careerteched/Forms/CTEProgramStandards2011.pdf

Equivalancy Credit Toolkit 3.3. OSPI. http://www.k12.wa.us/careerteched/Forms/EquivalencyCreditToolkit.PDF

Manufacturing Employer Survey: Manufacturing Advancement Pathways Project. Skill Up Washington. http://skillupwa.org/wp-content/uploads/SUP-MAPPsurvey.pdf

Pathways to Great Jobs in Washington State. Washington RoundTable, Boston Consulting Group, Partnership for Learning. http://www.waroundtable.com/wp-content/uploads/2016/10/WKWJ_FINAL_Report.pdf

Statewide Strategic Plan for Secondary Career and Technical Education. OSPI – Report to the Legislature. http://www.k12.wa.us/LegisGov/2012documents/StrategicePlanforCTE2012.pdf

Talent and Prosperity for All: The Strategic Plan for Unlocking Washington's Workforce Potential 2016. Workforce Training and Education Coordination Board. http://www.wtb.wa.gov/Documents/TAPPlanStrategicandOperational2016.pdf

Appendix C: RCWs for OSPI and Workforce Board's CTE Responsibilities

State laws included in this appendix describe the roles of OSPI and Workforce Board and the requirements regarding CTE. [Emphasis added by auditor is shown by underlining.]

OSPI

RCW 28A.700.010 defines CTE and describes what is required of school districts to receive approval for their CTE programs:

> (2) To receive approval, school district plans must:
>
> (a) Demonstrate how career and technical education programs will ensure academic rigor; align with the state's education reform requirements; help address the skills gap of Washington's economy; and maintain strong relationships with local career and technical education advisory councils for the design and delivery of career and technical education;
>
> (d) Demonstrate progress toward meeting or exceeding the targets established under RCW 28A.700.040 of an increased number of career and technical programs in high-demand fields;
>
> (5) As used in this section, "career and technical education" means a planned program of courses and learning experiences that begins with exploration of career options; supports basic academic and life skills; and enables achievement of high academic standards, leadership, options for high skill, high wage employment preparation, and advanced and continuing education.

RCW 28A.700.020 defines a high-demand program and requires the development of a list of high-demand programs:

> (1) The office of the superintendent of public instruction, in consultation with the workforce training and education coordinating board, the Washington state apprenticeship and training council, and the state board for community and technical colleges, shall develop a list of statewide high-demand programs for secondary career and technical education. The list shall be developed using the high-demand list maintained by workforce development councils in consultation with the employment security department, and the high employer demand programs of study identified by the workforce training and education coordinating board. Local school districts may recommend additional high-demand programs in consultation with local career and technical education advisory committees by submitting evidence of local high demand.
>
> (2)(a) "High-demand program" means a career and technical education program that prepares students for either a high employer demand program of study or a high-demand occupation, or both.
>
> (2)(b) "High employer demand program of study" means an apprenticeship or an undergraduate or graduate certificate or degree program in which the number of students per year prepared for employment from in-state programs is substantially fewer than the number of projected job openings per year in that field, either statewide or in a substate region.
>
> (2)(c) "High-demand occupation" means an occupation with a substantial number of current or projected employment opportunities.

RCW 28A.700.040 suggests that not all CTE course offerings must align with high demand areas:

> (1) The office of the superintendent of public instruction shall establish performance measures and targets and monitor the performance of career and technical education programs in at least the following areas:
>
> (a) Student participation in and completion of high-demand programs as identified under RCW 28A.700.020.

RCW 28A.700.060 requires that OSPI, SBCTC and Workforce Board continue to select additional model programs of study to develop:

> (3) During the 2008-09 school year, model career and technical education programs of study shall be developed for the following high-demand programs: Construction, health care, and information technology. Each school year thereafter, the office of the superintendent of public instruction, the state board for community and technical colleges, and the workforce training and education coordinating board shall select additional programs of study to develop, with a priority on high-demand programs as identified under RCW 28A.700.020.

Workforce Board

RCW 28C.18.060 describes Workforce Board's duties to make the state's CTE programs more integrated and coordinated. These duties, which are shown below, are not accompanied by specific authority to require other agencies to take specific measures towards this integration and coordination.

> The board, in cooperation with the operating agencies of the state training system and private career schools and colleges, shall:
>
> (3) …perform a biennial assessment of the vocational education, training, and adult basic educationand literacy needs of the state; identify ongoing and strategic education needs; and assess the extent to which employment, training, vocational and basic education services.. represent a consistent, integrated approach to meet such needs…
>
> (6) Provide for coordination among the different operating agencies and components of the state training system at the state level and at the regional level…

Workforce Board has specific statutory responsibilities related to articulation. RCW 28C.18.060 describes these duties:

> The board, in cooperation with the operating agencies of the state training system and private career schools and colleges, shall…
>
> (12) Provide for the development of common course description formats...
>
> (14) In cooperation with the student achievement council, facilitate transfer of credit policies and agreements between institutions of the state training system, and encourage articulation agreements for programs encompassing two years of secondary workforce education and two years of postsecondary workforce education…

Under RCW 28C.18.070, Workforce Board has a significant role with regards to the development of the state's CTE policy, but lacks specific authority to require other agencies to take specific measures to enact this policy.

> (2) The establishment of the [Workforce Board] was an integral step in developing a strategic approach to workforce development. For the coordinating board to carry out its intended role, the board must be able to give unambiguous guidance to operating agencies, the governor, and the legislature. It is the intent of chapter 130, Laws of 1995, to clarify the preeminent role intended for the [Workforce Board] in coordination and policy development of the state's workforce development efforts.

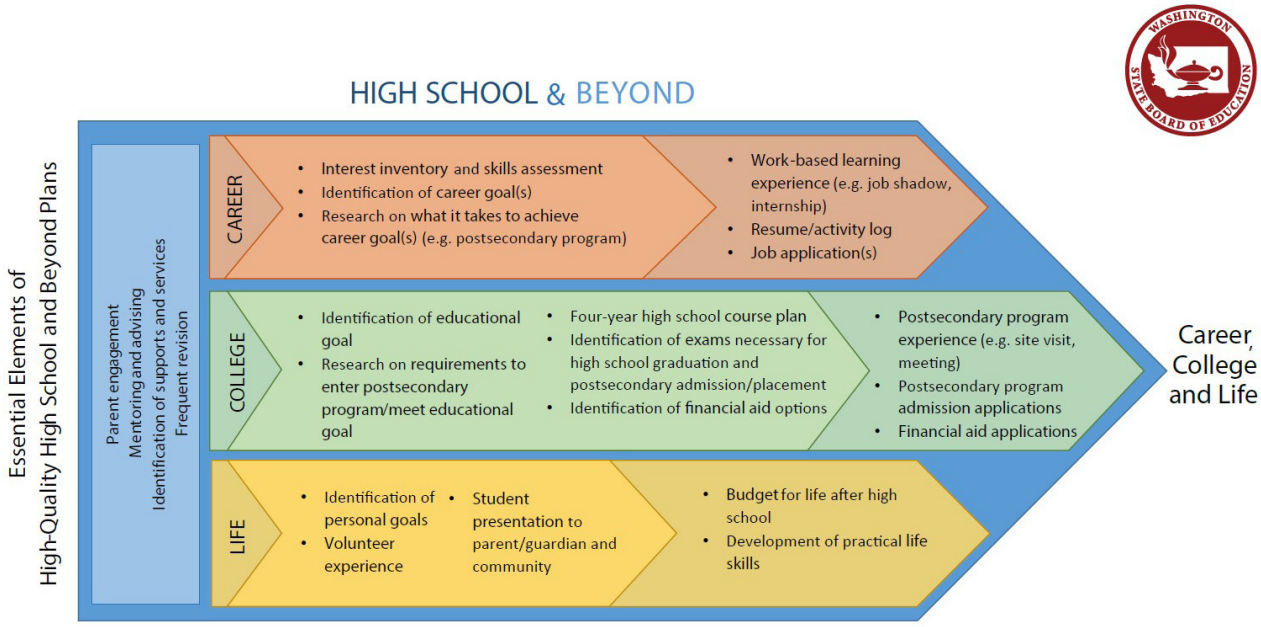
Appendix D: A Model Course Framework and the High School and Beyond Plan

How the model course framework recommended in this audit would help students plan their future and meet one of their graduation requirements

Educating students about CTE and apprenticeship opportunities in the 7th or 8th grade can help them make more informed decisions about potential career paths.

Better marketing of CTE and apprenticeship opportunities in the 7th and 8th grades through an OSPI-developed career exploration course could make students and parents aware of these and other career pathways that require higher education. This course could help point more students toward high-paying careers and allow them to meet the High School and Beyond Plan graduation requirements as illustrated in **Figure 1**.

Figure 1 – The State Board of Education illustrates the actions and goals that are essential for a high quality High School and Beyond Plan



Note: The actions and goals listed above go beyond the minimum required by law and include promising practices for a high-quality plan, according to the State Board of Education.

Source: State Board of Education's representation of the High School and Beyond Plan.

Appendix E: Washington Apprenticeship Programs Leading to High Wage Employment

Recent state efforts to incorporate youth apprenticeships into the state's K-12 system

In 2006, the Legislature tasked OSPI and the Washington State Apprenticeship and Training Council with developing pre-apprenticeship program guidelines, as well as awarding incentive and pilot grants to school districts to aid in secondary pre-apprenticeship development and articulation. This initiative helped launch Running Start for the Trades, which the Legislature funded until the 2011-12 school year. Afterward, legislative budget priorities shifted, and the state stopped collecting data on student participation in apprenticeship programs. Officials at the Department of Labor & Industries (L&I) said that although this work resulted in apprenticeship programs at two skill centers that are still in existence, funding was discontinued because of the recession.

The importance of youth apprenticeships was recently recognized by Governor Inslee:

> *We ought to be strengthening and expanding pre-apprenticeship programs in our schools… youth apprenticeship leverages one of our state's most effective workforce development investments, which is registered apprenticeships. The apprenticeship model is the gold standard of work-based learning.*

In 2016, Washington was awarded a $2.7 million federal grant to help grow and diversify apprenticeships. The grant, overseen by L&I, focuses partly on youth and will allow the agency to improve tracking of youth apprenticeship growth and success.

The Aerospace Joint Apprenticeship Committee (AJAC) is taking a leading role in expanding youth apprenticeships into the K-12 educational system. As of July 2017, AJAC reports the following progress in secondary schools:

- Tacoma Public Schools has 14 youth apprentices receiving full-time on-the-job-training (OJT) at local advanced manufacturing companies. As these students entered their second related supplemental instruction (RSI) class in fall 2017, the program began recruiting for a new class of youth apprentices.
- West Valley School District has three youth apprentices receiving full-time OJT at local advanced manufacturing companies. Recruitment will continue as a selection of youth apprentices enter from the Core Plus program. The goal is to enroll 10-15 youth apprentices by fall 2017.

In addition, AJAC is exploring ways to expand their apprenticeship efforts with school districts in Everett, Puyallup, Snohomish and Sumner as well as the Sno-Isle Skills Center.

Federal government departments also acknowledge youth apprenticeships

The U.S. Department of Education recognized the importance of youth apprenticeships in a July 2016 report titled Connecting Secondary Career and Technical Education to Registered Apprenticeships, stating that:

> *Administrators in study states suggested that there is often a lack of awareness–among employers, school district staff, students, and parents – of the potential benefits that aligned CTE and RA [registered apprenticeship] programs offer. To counter commonly held misperceptions, states created marketing materials to disseminate information on program opportunities. These include resources to help employers understand how high school program*

sponsorship could benefit their companies, and tools to support educators in recruiting CTE students. Several study states also developed strategies to market apprenticeship opportunities to CTE students and their parents, who often lacked information on program options. Engaging with parents was particularly important, because parental consent is typically required for minors to participate in RA or pre-apprenticeship programs offered in some industry areas.

To assess the opportunities that apprenticeships offer, this audit compared L&I's list of apprenticeship offerings with the most current (May 2015) occupational and employment wage estimates from the Bureau of Labor Statistics. **Figure 2** lists the current apprenticeship program offerings in Washington resulting in trade jobs that pay more than $54,000 a year on average.

Figure 2 – Occupations with apprenticeship pathways

Annual wages above the state average of $54,000	
Aerospace (Aircraft Mechanic)	$70,200
Boilermakers	$54,620
Electrical Lineworkers	$82,220
Electrical Workers (Electrician)	$64,860
Glaziers, Architectural Metal and Glass Workers	$58,400
Heat and Frost Insulators and Asbestos Workers	$58,330
Ironworkers	$75,310
Masonry (Bricklaying and Tilesetting)	$74,170
Millwrights	$63,870
Operating Engineers	$58,830
Painters and Decorators (Taper)	$54,030
Piledrivers	$72,930
Plumbers, Steamfitters, Pipefitters	$66,560
Refrigeration Workers	$56,450
Sheet Metal Workers	$61,670
Stationary Engineers	$64,310
Additional occupations with annual wages at or above $50,000	
Automotive Machinists (auto body)	$50,290
Carpenters	$53,810
Lathing, Acoustical, Drywall and Thermal Insulation	$53,740
Plasterers	$52,510

**Note: Not every L&I apprenticeship program has an equivalent on the Bureau of Labor Statistics list, so this table may not be exhaustive.*

Sources: Washington State Department of Labor and Industries Catalog of Programs and Services (http://www.lni.wa.gov/tradeslicensing/apprenticeship/files/pubs/appcat.pdf)
U.S. Department of Labor, Bureau of Labor Statistics (https://www.bls.gov/oes/current/oes_wa.htm#47-0000).

Appendix F: How CTE Courses Align with High-Paying, High Demand Occupations

A comparison of CTE course enrollment to corresponding high-paying, high-demand occupations (listed in **Figure 3**) shows many courses did not correspond to the percentage of forecasted job openings. OSPI and school districts should focus their CTE programs in occupational areas that pay more than the state annual average and have high or stable demand. Conversely, OSPI and school districts should discontinue CTE programs in occupational areas that pay less than average and do not have high or stable demand. **Appendix I** lists CTE course areas and breaks out their corresponding Classification of Instructional Program (CIP) number and title.

Figure 3 – Top 75% CTE course areas by enrollment compared to annual average forecasted job openings and state average wage

Percent of CTE enrollments in 2015 school year; Percent of forecasted job openings through 2024; Job ranking out of 284 groups of related occupations; State average wage $54,000 in 2015; Average wage for each occupation

Top 24 CTE course areas (highest to lowest enrollment)	Percent of CTE enrollments	Average annual jobs		Average wage	
		Percent of all growth	Rank	Below or above $54,000	For this occupation
Data Entry	8.3%	0.08%	146	↓	$35,950
Design	5.3%	0.16%	93	↓	$51,690
Photography	4.5%	0.08%	147	↓	$40,559
Interpreter/Translator	4.2%	0.06%	155	↓	$39,535
Family & Consumer Sciences	3.9%	0.01%	258	↑	$55,077
Dietetics/Nutrition	3.9%	0.03%	201	↑	$54,762
Marketing Management & Research	3.7%	0.59%	43	↑	$96,615
Agricultural/Food Sciences	3.7%	0.02%	213	↑	$62,753
Drafting	3.6%	0.11%	122	↑	$68,219
Communication Technologies	3.3%	0.08%	140	↓	$51,060
Mathematics	3.1%	0.04%	184	↑	$79,415
Food Preparation	3.0%	1.53%	14	↓	$32,253
Digital Graphics	3.0%	0.39%	57	↑	$72,627
Business Management & Administration	2.8%	2.64%	10	↑	$109,576
Computer Systems	2.8%	1.62%	13	↑	$97,717
Communications, Journalism & Broadcasting	2.3%	0.33%	63	↑	$63,477
Athletic Training	2.2%	0.01%	266	↓	$48,016
Woodworking	2.2%	0.21%	86	↓	$37,164
Agricultural Mechanics & Machinery Operation	2.0%	0.24%	76	↓	$37,453
Forestry & Conservation	1.8%	0.09%	137	↓	$52,650
Medical Science	1.7%	0.09%	131	↑	$81,677
Arts and Crafts	1.6%	0.03%	199	↑	$67,119
Miscellaneous Health Services	1.5%	0.23%	81	↓	$41,823
Sales	1.4%	3.80%	5	↑	$60,291

Data source: Auditor analysis of unaudited OSPI secondary CTE enrollment data, forecasted ESD employment data, EDEPS occupational groupings, and U.S. Bureau of Labor Statistics wage data.

Appendix G: How Occupations with the Most Forecasted Job Openings Align with CTE Courses

A comparison of occupations with the most forecasted job openings and how they align with CTE course enrollments shows that some job openings had related CTE enrollment that corresponds to high-paying, high-demand occupations and others had none. OSPI and school districts should focus their CTE programs in occupational areas that pay more than the state annual average wage and have high or stable demand. Conversely, OSPI and school districts should discontinue CTE programs in occupational areas that pay less than average or do not have high or stable demand.

The comprehensive table in **Figure 4** shows the job openings that had some related CTE enrollment for the top 75 percent of job openings. Courses with some enrollment represent opportunities for districts to refocus their efforts on more desirable opportunities. For example, the table shows how carpentry pays above average wages, while the percentage of CTE enrollments for these types of courses is less than the percentage of forecasted openings.

Figure 4 – Top 75% of forecasted job openings with some CTE enrollment in related courses

Percent of CTE enrollments in 2015 school year; Percent of forecasted job openings through 2024; Job ranking out of 284 groups of related occupations; State average wage $54,000 in 2015; Average wage for each occupation

Jobs (highest to lowest openings)	Average annual jobs		CTE enrollments		Average wage	
	Percent of jobs	Rank	Percent of all	Rank	Below or above $54,000	For this occupation
Sales	3.8%	5	1.4%	24	↑	$60,291
Business Management & Administration	2.6%	10	2.8%	14	↑	$109,576
Computer Systems	1.6%	13	2.8%	15	↑	$97,717
Food Preparation	1.5%	14	3.0%	12	↓	$32,253
Secretarial	1.5%	15	0.9%	30	↓	$43,845
Bookkeeping	1.4%	16	< 0.1%	95	↓	$43,090
Chef	1.0%	21	0.9%	28	↓	$29,754
Barbering/Cosmetology	1.0%	22	0.3%	54	↓	$35,176
Carpentry	1.0%	24	0.7%	37	↑	$54,692
Health, Physical Education & Fitness	0.9%	26	0.3%	55	↓	$44,293
Nurse Assisting	0.8%	27	0.5%	44	↓	$30,011
Accounting	0.8%	31	0.8%	31	↑	$75,236
Security Services	0.7%	33	< 0.1%	89	↓	$35,016
Clerical Supervision & Management	0.7%	37	< 0.1%	79	↑	$58,464
Law Enforcement	0.6%	39	0.8%	35	↑	$66,357
Finance & Financial Management Services	0.6%	40	0.5%	45	↑	$96,193
Metal/Plastic Machine Work	0.6%	42	0.2%	61	↓	$46,148
Marketing Management & Research	0.6%	43	3.7%	7	↑	$96,615

Data source: Auditor analysis of unaudited OSPI secondary CTE enrollment data, forecasted ESD employment data, EDEPS occupational groupings, and U.S. Bureau of Labor Statistics wage data.

Appendix H: Occupations with 75 percent of Forecasted Job Openings and No CTE Enrollment

A comparison of occupations with the most forecasted job openings and how they align with CTE course enrollments shows that some job openings had related CTE enrollment that corresponds to high-paying, high-demand occupations and others had none at all. OSPI and school districts should focus their CTE programs in occupational areas that pay more than the state annual average wage and have high or stable demand. Conversely, OSPI and school districts should discontinue CTE programs in occupational areas that pay less than average or do not have high or stable demand.

The comprehensive table in **Figure 5** shows the job openings that had no related CTE enrollment for the top 75 percent of job openings. However, many of these occupations pay poorly or are unsuitable for teaching to young people.

Figure 5 – Top 75% of forecasted job openings with no related CTE courses

Percent of forecasted job openings through 2024; Job ranking out of 284 groups of related occupations; State average wage $54,000 in 2015; Average wage for each occupation

Jobs (highest to lowest openings)	Average annual jobs		Average wage	
	Percent of all growth	Rank	Below or above $54,000	For this occupation
Misc. Retail	7.6%	1	↓	$29,244
Misc. Food Preparation & Serving	5.4%	2	↓	$24,589
Office Clerical	4.8%	3	↓	$36,718
Food Serving	3.9%	4	↓	$28,652
Building & Grounds Cleaning & Maintenance	3.8%	6	↓	$30,764
Misc. Material Moving	3.5%	7	↓	$32,866
Misc. Clerical & Admin Support	3.3%	8	↓	$38,265
Misc. Farm, Forestry & Conservation	2.9%	9	↓	$29,913
Truck & Bus Driving	2.2%	11	↓	$42,893
Misc. Personal Service	2.1%	12	↓	$26,177
Computer Engineering	1.3%	17	↑	$120,488
Line Supervision	1.2%	18	↑	$70,346
Misc. Construction & Extraction	1.2%	19	↓	$45,474
Misc. Recreation & Entertainment	1.1%	20	↓	$31,291
Misc. Production	1.0%	23	↓	$34,163
Teaching Assisting	1.0%	25	↓	$32,028
Misc. Transportation	0.8%	28	↓	$31,026
Nursing	0.8%	29	↑	$80,203
Building Maintenance	0.8%	30	↓	$43,943
Real Estate	0.7%	32	↑	$63,157
Misc. Management & Management Support	0.7%	34	↑	$114,833
Adult & Continuing Education	0.7%	35	↓	$53,434
Child Care	0.7%	36	↓	$25,606
Human Resources Management	0.7%	38	↑	$78,138
Elementary Education	0.6%	41	↑	$61,012
Bartending	0.6%	44	↓	$31,082

Data source: Auditor analysis of unaudited OSPI secondary CTE enrollment data, forecasted ESD employment data, EDEPS occupational groupings, and U.S. Bureau of Labor Statistics wage data.

Appendix I: Classification of Instructional Programs

The information below shows the specific types of courses that fall within each CTE course area. Each course has a corresponding Classification of Instructional Programs (CIP) code. As mentioned in the report, the CIP code was used to match CTE course areas to corresponding occupations and to assess how well CTE course areas with the most enrollment aligned with high-wage, high-paying occupations.

Name of course area	Classification of Instructional Programs (CIPs)	Number of CTE enrollments
Data Entry	110601 - Digital Communication Tools	15,396
	110699 - Office User Specialist	8,044
Design	500499 - Design and Commercial Art Foundations	2,091
	100290 - Visual Communications	4,967
	500402 - Graphic Design/Commercial and Advertising Art	6,066
	500502 - Technical Theater/Theater Design Technology/Technician	1,646
Photography	500406 - Commercial Photography	12,719
Interpreter/Translator	161603 - Sign Language Interpretation/Interpreter	11,499
	160103 - Translation and Interpretation	226
Family and Consumer Sciences	190401 - Consumer and Family Resources	3,093
	190704 - Family Systems	1,005
	190707 - Family and Community Services	14
	190601 - Housing, Interiors and Furnishings	565
	190706 - Child Development/Parenting	3,158
	190403 - Consumer Services	679
	190701 - Human Development	2,586
Dietetics/Nutrition	190504 - Food Science, Dietetics, and Nutrition	559
	190501 - Nutrition and Wellness	10,471
Marketing Management and Research	521401 - Marketing Management	1,904
	521403 - International Marketing	8
	521400 - Introduction Marketing	8,479
Agricultural/Food Sciences	11101 - Plant Sciences, General	822
	11102 - Agronomy and Crop Science	19
	11103 - Horticultural Science	3,765
	10901 - Animal Sciences, General	1,829
	11201 - Soil Science and Agronomy, General	55
	10000 - Agriculture, General	3,708
	11001 - Food Science	67
	11002 - Food Technology and Processing	27
Drafting	151302 - CAD/CADD Drafting and/or Design Technology	2,690
	151304 - Civil Drafting and Civil Engineering CAD/CADD	166
	151305 - Electrical/Electronics Drafting CAD/CADD	335
	151306 - Mechanical Drafting and CAD/CADD	399
	151303 - High-Performance Green Building Architectural Drafting and Design	720
	151301 - Drafting and Design Technology General	1,450
	149991 - Engineering Design 1	4,413
Communication Technologies	500602 - Cinematography and Cinema Production	436
	100202 - Video Production Technology/Technician	5,399
	100201 - Photography and Video Foundations	3,118
	100203 - Recording Arts and Sound Reinforcement Technology	459

Name of course area	Classification of Instructional Programs (CIPs)	Number of CTE enrollments
Mathematics	270301 - Applied Math	4,240
	270305 - Financial Math	4,601
Food Preparation	120505 - Food Production and Services	4,454
	120500 - Foods and Related Culinary Arts foundations	4,049
Digital Graphics	100304 - Animation Technology/Video Graphics and Special Effects	947
	110801 - Webpage/Digital/Multimedia and Information Design	5,235
	110803 - Video Game Design/Digital Computer Animation for Game Design	1,965
	111004 - Web/Multimedia Management and Webmaster	21
	500102 - Digital Arts	212
Business Management and Administration	520701 - Entrepreneurship	1,440
	279998 - Business Math	3,108
	520211 - Project Management	898
	520703 - Small Business Administration/Management	73
	520000 - Introduction to Business	1,430
	521101 - International Business and Commerce	633
	520201 - Business Administration Management	308
Computer Systems	110701 - Introduction to Computer Science	843
	110103 - Fundamentals of Information Technology	288
	111006 - Computer Support Specialist	52
	430116 - Cyber/Computer Forensics	153
	110901 - Computer Systems Networking and Telecommunications	526
	110201 - Computer Programming	6,015
Communications, Journalism and Broadcasting	520501 - Business Communications	2,773
	90701 - TV/Radio Broadcast Journalism Technology	639
	10802 - Agricultural Communications/ Journalism	303
	91001 - Publishing	2,693
Athletic Training	510913 - Sports Medicine	6,204
Woodworking	480701 - Woodworking Foundations	5,185
	480703 - Cabinetmaking and Millwork/Mill Wright	894
Agricultural Mechanics and Machinery Operation	10204 - Agriculture Power Machinery Operation	16
	10201 - Agricultural Mechanization, General	4,005
	10205 - Agricultural Mechanics and Equipment/Machine Technology	1,587
Forestry and Conservation	30601 - Wildlife and Wild lands Science and Management	69
	30501 - Forestry, General	114
	30201 - Natural Resources Management and Policy	810
	30508 - Urban Forestry	21
	30101 - Natural Resources/Conservation, General	3,974
Medical Science	260102 - Biomedical Sciences	4,727
Arts and Crafts	500797 - Professional Production Arts Technology/Technician	3,007
	500713 - Wearable Metal and Jewelry Design Technology/Technician	1,539
Miscellaneous Health Services	510800 - Therapeutic Services, other	2,317
	510000 - Introduction to Health Science Careers	1,901
Sales	521801 - Marketing Operations	3,195
	521804 - Selling Skills and Sales Operations	442
	521999 - Social Media Marketing	68
	521902 - Fashion Merchandising	221

Appendix J: Standard Occupational Classifications

Standard occupational classifications (SOCs) code titles and their Unit of Analysis Title designations were gathered from the EDEPS website (http://www.edeps.org/). Several of the SOC codes from the EDEPS website were missing, so we used the ESD Alternative Occupation Projections document to fill in codes for the following: 11-3011, 11-3051, 11-3061, 11-2022, 11-3021, 11-3111, 11-3121, 11-3131.

Unit of analysis	Standard Occupational Classifications (SOC)
Miscellaneous Retail Workers	41-2011 - Cashiers 41-2021 - Counter and Rental Clerks 41-9091 - Door-to-Door Sales Workers, News and Street Vendors, and Related Workers 41-2012 - Gaming Change Persons and Booth Cashiers 41-2031 - Retail Salespersons
Miscellaneous Food Preparation and Serving Workers	35-3021 - Combined Food Preparation and Serving Workers, Including Fast Food 35-9011 - Dining Room and Cafeteria Attendants and Bartender Helpers 35-9021 - Dishwashers 35-9099 - Food Preparation and Serving Related Workers, All Other 35-2021 - Food Preparation Workers
Office Clerical	43-5011 - Cargo and Freight Agents 43-4021 - Correspondence Clerks 43-4051 - Customer Service Representatives 43-5032 - Dispatchers, Except Police, Fire, and Ambulance 43-4161 - Human Resources Assistants, Except Payroll and Timekeeping 43-4199 - Information and Record Clerks, All Other 43-9041 - Insurance Claims and Policy Processing Clerks 43-9199 - Office and Administrative Support Workers, All Other 43-9061 - Office Clerks, General 43-9071 - Office Machine Operators, Except Computer 43-3061 - Procurement Clerks 43-4171 - Receptionists and Information Clerks 43-2021 - Telephone Operators 43-9022 - Word Processors and Typists
Food Serving	35-3022 - Counter Attendants, Cafeteria, Food Concession, and Coffee Shop 35-3041 - Food Servers, Nonrestaurant 35-9031 - Hosts and Hostesses, Restaurant, Lounge, and Coffee Shop 35-3031 - Waiters and Waitresses
Sales	41-3011 - Advertising Sales Agents 41-9011 - Demonstrators and Product Promoters 41-1012 - First-Line Supervisors of Non-Retail Sales Workers 41-1011 - First-Line Supervisors of Retail Sales Workers 41-2022 - Parts Salespersons 13-1023 - Purchasing Agents, Except Wholesale, Retail, and Farm Products 41-9099 - Sales and Related Workers, All Other 41-9031 - Sales Engineers 41-3099 - Sales Representatives, Services, All Other 41-4012 - Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products 41-4011 - Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products 41-9041 - Telemarketers

Unit of analysis	Standard Occupational Classifications (SOC)
Building and Grounds Cleaning and Maintenance Workers	37-2019 - Building Cleaning Workers, All Other 37-1011 - First-Line Supervisors of Housekeeping and Janitorial Workers 37-3019 - Grounds Maintenance Workers, All Other 37-2011 - Janitors and Cleaners, Except Maids and Housekeeping Cleaners 37-3011 - Landscaping and Groundskeeping Workers 37-2012 - Maids and Housekeeping Cleaners 37-2021 - Pest Control Workers 37-3013 - Tree Trimmers and Pruners
Miscellaneous Material Moving Workers	53-7061 - Cleaners of Vehicles and Equipment 53-7011 - Conveyor Operators and Tenders 53-7071 - Gas Compressor and Gas Pumping Station Operators 53-7051 - Industrial Truck and Tractor Operators 53-7062 - Laborers and Freight, Stock, and Material Movers, Hand 53-7033 - Loading Machine Operators, Underground Mining 53-7063 - Machine Feeders and Offbearers 53-7199 - Material Moving Workers, All Other 53-7111 - Mine Shuttle Car Operators 53-7064 - Packers and Packagers, Hand 53-7072 - Pump Operators, Except Wellhead Pumpers 53-7081 - Refuse and Recyclable Material Collectors 53-7121 - Tank Car, Truck, and Ship Loaders 53-7073 - Wellhead Pumpers
Miscellaneous Clerical and Admin Support Occupations	43-3021 - Billing and Posting Clerks 43-2099 - Communications Equipment Operators, All Other 43-5021 - Couriers and Messengers 43-4031 - Court, Municipal, and License Clerks 43-4071 - File Clerks 43-3099 - Financial Clerks, All Other 43-3041 - Gaming Cage Workers 43-4111 - Interviewers, Except Eligibility and Loan 43-9051 - Mail Clerks and Mail Machine Operators, Except Postal Service 43-5041 - Meter Readers, Utilities 43-4151 - Order Clerks 43-5031 - Police, Fire, and Ambulance Dispatchers 43-5051 - Postal Service Clerks 43-5052 - Postal Service Mail Carriers 43-5053 - Postal Service Mail Sorters, Processors, and Processing Machine Operators 43-5061 - Production, Planning, and Expediting Clerks 43-9081 - Proofreaders and Copy Markers 43-4181 - Reservation and Transportation Ticket Agents and Travel Clerks 43-5071 - Shipping, Receiving, and Traffic Clerks 43-5081 - Stock Clerks and Order Fillers 43-2011 - Switchboard Operators, Including Answering Service 43-3071 - Tellers 43-5111 - Weighers, Measurers, Checkers, and Samplers, Recordkeeping

Unit of analysis	Standard Occupational Classifications (SOC)
Miscellaneous Farm, Forestry and Conservation Workers	45-2099 - Agricultural Workers, All Other 45-4021 - Fallers 45-2092 - Farmworkers and Laborers, Crop, Nursery, and Greenhouse 45-2093 - Farmworkers, Farm, Ranch, and Aquacultural Animals 45-4011 - Forest and Conservation Workers 45-3021 - Hunters and Trappers 45-4023 - Log Graders and Scalers 45-4029 - Logging Workers, All Other
Business Management and Administration	11-3011 - Administrative Services Managers 13-1011 - Agents and Business Managers of Artists, Performers, and Athletes 13-1199 - Business Operations Specialists, All Other 25-1011 - Business Teachers, Postsecondary 11-1011 - Chief Executives 11-1021 - General and Operations Managers 11-3051 - Industrial Production Managers 13-1111 - Management Analysts 11-3061 - Purchasing Managers 11-2022 - Sales Managers
Truck and Bus Driving	53-3022 - Bus Drivers, School or Special Client 53-3021 - Bus Drivers, Transit and Intercity 53-3032 - Heavy and Tractor-Trailer Truck Drivers 53-3033 - Light Truck or Delivery Services Drivers
Miscellaneous Personal Service Workers	39-6011 - Baggage Porters and Bellhops 39-6012 - Concierges 39-4021 - Funeral Attendants 39-5093 - Shampooers 39-9021 - Personal Care Aides 39-9099 - Personal Care and Service Workers, All Other 39-9041 - Residential Advisors 39-7011 - Tour Guides and Escorts
Computer Systems	15-1111 - Computer and Information Research Scientists 11-3021 - Computer and Information Systems Managers 15-1143 - Computer Network Architects 15-1152 - Computer Network Support Specialists 51-4012 - Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic 15-1199 - Computer Occupations, All Other 15-1131 - Computer Programmers 25-1021 - Computer Science Teachers, Postsecondary 15-1121 - Computer Systems Analysts 15-1151 - Computer User Support Specialists 15-1141 - Database Administrators 15-1122 - Information Security Analysts 15-1142 - Network and Computer Systems Administrators
Food Preparation	35-2011 - Cooks, Fast Food 35-2012 - Cooks, Institution and Cafeteria 35-2015 - Cooks, Short Order 35-1012 - First-Line Supervisors of Food Preparation and Serving Workers
Secretarial	43-6011 - Executive Secretaries and Executive Administrative Assistants 43-6014 - Secretaries and Administrative Assistants, Except Legal, Medical, and Executive

Unit of analysis	Standard Occupational Classifications (SOC)
Bookkeeping	43-3031 - Bookkeeping, Accounting, and Auditing Clerks 43-4011 - Brokerage Clerks 43-3051 - Payroll and Timekeeping Clerks 43-9111 - Statistical Assistants 13-2082 - Tax Preparers
Computer Engineering	17-2061 - Computer Hardware Engineers 15-1132 - Software Developers, Applications 15-1133 - Software Developers, Systems Software
Line Supervision	53-1011 - Aircraft Cargo Handling Supervisors 47-1011 - First-Line Supervisors of Construction Trades and Extraction Workers 45-1011 - First-Line Supervisors of Farming, Fishing, and Forestry Workers 53-1021 - First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand 49-1011 - First-Line Supervisors of Mechanics, Installers, and Repairers 51-1011 - First-Line Supervisors of Production and Operating Workers 53-1031 - First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators
Miscellaneous Construction and Extraction Workers	47-4099 - Construction and Related Workers, All Other 47-2061 - Construction Laborers 47-4031 - Fence Erectors 47-3019 - Helpers, Construction Trades, All Other 47-3011 - Helpers--Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters 47-3012 - Helpers--Carpenters 47-3013 - Helpers--Electricians 47-5081 - Helpers--Extraction Workers 47-3015 - Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters 47-3016 - Helpers--Roofers 47-4051 - Highway Maintenance Workers 47-5051 - Rock Splitters, Quarry 47-5061 - Roof Bolters, Mining 47-4091 - Segmental Pavers 47-2082 - Tapers
Miscellaneous Recreation and Entertainment Workers	39-3091 - Amusement and Recreation Attendants 39-3092 - Costume Attendants 39-3099 - Entertainment Attendants and Related Workers, All Other 39-1021 - First-Line Supervisors of Personal Service Workers 39-3012 - Gaming and Sports Book Writers and Runners 39-3011 - Gaming Dealers 39-3019 - Gaming Service Workers, All Other 39-1011 - Gaming Supervisors 39-3093 - Locker Room, Coatroom, and Dressing Room Attendants 39-3021 - Motion Picture Projectionists 39-1012 - Slot Supervisors 27-2023 - Umpires, Referees, and Other Sports Officials 39-3031 - Ushers, Lobby Attendants, and Ticket Takers
Chef	35-1011 - Chefs and Head Cooks 35-2019 - Cooks, All Other 35-2013 - Cooks, Private Household 35-2014 - Cooks, Restaurant

Unit of analysis	Standard Occupational Classifications (SOC)
Barbering/Cosmetology	39-5011 - Barbers 39-5012 - Hairdressers, Hairstylists, and Cosmetologists 39-5091 - Makeup Artists, Theatrical and Performance 39-5092 - Manicurists and Pedicurists 39-5094 - Skincare Specialists
Miscellaneous Production Workers	51-9191 - Adhesive Bonding Machine Operators and Tenders 51-9192 - Cleaning, Washing, and Metal Pickling Equipment Operators and Tenders 51-9121 - Coating, Painting, and Spraying Machine Setters, Operators, and Tenders 51-9193 - Cooling and Freezing Equipment Operators and Tenders 51-9021 - Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders 51-9031 - Cutters and Trimmers, Hand 51-9032 - Cutting and Slicing Machine Setters, Operators, and Tenders 51-9041 - Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders 51-9051 - Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders 51-9022 - Grinding and Polishing Workers, Hand 51-9198 - Helpers--Production Workers 51-4051 - Metal-Refining Furnace Operators and Tenders 51-9023 - Mixing and Blending Machine Setters, Operators, and Tenders 51-9195 - Molders, Shapers, and Casters, Except Metal and Plastic 51-9111 - Packaging and Filling Machine Operators and Tenders 51-9123 - Painting, Coating, and Decorating Workers 51-9196 - Paper Goods Machine Setters, Operators, and Tenders 51-9151 - Photographic Process Workers and Processing Machine Operators 51-5113 - Print Binding and Finishing Workers 51-9199 - Production Workers, All Other 51-9012 - Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders 51-9197 - Tire Builders
Carpentry	47-2031 - Carpenters
Teaching Assisting	25-9041 - Teacher Assistants
Health, Physical Education and Fitness	27-2021 - Athletes and Sports Competitors 27-2022 - Coaches and Scouts 39-9031 - Fitness Trainers and Aerobics Instructors 25-1193 - Recreation and Fitness Studies Teachers, Postsecondary
Nurse Assisting	31-1014 - Nursing Assistants
Miscellaneous Transportation Workers	53-6031 - Automotive and Watercraft Service Attendants 53-6011 - Bridge and Lock Tenders 53-3031 - Driver/Sales Workers 53-3099 - Motor Vehicle Operators, All Other 53-5022 - Motorboat Operators 53-6021 - Parking Lot Attendants 53-5011 - Sailors and Marine Oilers 53-3041 - Taxi Drivers and Chauffeurs 53-6041 - Traffic Technicians 53-6061 - Transportation Attendants, Except Flight Attendants 53-6051 - Transportation Inspectors 53-6099 - Transportation Workers, All Other

Unit of analysis	Standard Occupational Classifications (SOC)
Nursing	29-1161 - Nurse Midwives 29-1171 - Nurse Practitioners 25-1072 - Nursing Instructors and Teachers, Postsecondary 29-1141 - Registered Nurses
Building Maintenance	49-9071 - Maintenance and Repair Workers, General
Accounting	13-2011 - Accountants and Auditors 13-2061 - Financial Examiners 13-2081 - Tax Examiners and Collectors, and Revenue Agents
Real Estate	13-2021 - Appraisers and Assessors of Real Estate 11-9141 - Property, Real Estate, and Community Association Managers 41-9021 - Real Estate Brokers 41-9022 - Real Estate Sales Agents
Security Services	33-9032 - Security Guards 33-3052 - Transit and Railroad Police 33-9093 - Transportation Security Screeners
Miscellaneous Management and Management Support Occupations	11-9041 - Architectural and Engineering Managers 13-1041 - Compliance Officers 11-9199 - Managers, All Other 11-9121 - Natural Sciences Managers
Adult and Continuing Education	25-3011 - Adult Basic and Secondary Education and Literacy Teachers and Instructors 25-3021 - Self-Enrichment Education Teachers 25-1194 - Vocational Education Teachers, Postsecondary
Child Care	39-9011 - Childcare Workers
Clerical Supervision and Management	43-1011 - First-Line Supervisors of Office and Administrative Support Workers
Human Resources Management	11-3111 - Compensation and Benefits Managers 13-1141 - Compensation, Benefits, and Job Analysis Specialists 11-3121 - Human Resources Managers 13-1071 - Human Resources Specialists 13-1075 - Labor Relations Specialists 11-3131 - Training and Development Managers 13-1151 - Training and Development Specialists
Law Enforcement	33-3011 - Bailiffs 33-3012 - Correctional Officers and Jailers 25-1111 - Criminal Justice and Law Enforcement Teachers, Postsecondary 33-3021 - Detectives and Criminal Investigators 33-1011 - First-Line Supervisors of Correctional Officers 33-1012 - First-Line Supervisors of Police and Detectives 33-3031 - Fish and Game Wardens 19-4092 - Forensic Science Technicians 33-3051 - Police and Sheriff's Patrol Officers 33-9021 - Private Detectives and Investigators 33-9099 - Protective Service Workers, All Other

Unit of analysis	Standard Occupational Classifications (SOC)
Finance and Financial Management Services	13-2031 - Budget Analysts 13-2041 - Credit Analysts 13-2071 - Credit Counselors 13-2051 - Financial Analysts 11-3031 - Financial Managers 13-2099 - Financial Specialists, All Other 13-2072 - Loan Officers
Elementary Education	25-2021 - Elementary School Teachers, Except Special Education
Metal/Plastic Machine Work	51-4011 - Computer-Controlled Machine Tool Operators, Metal and Plastic 51-4031 - Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic 51-4032 - Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic 51-4021 - Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic 51-4022 - Forging Machine Setters, Operators, and Tenders, Metal and Plastic 51-4033 - Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic 51-4191 - Heat Treating Equipment Setters, Operators, and Tenders, Metal and Plastic 51-4034 - Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic 51-4192 - Layout Workers, Metal and Plastic 51-4041 - Machinists 51-4199 - Metal Workers and Plastic Workers, All Other 51-4035 - Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic 51-4072 - Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic 51-4081 - Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic 51-4193 - Plating and Coating Machine Setters, Operators, and Tenders, Metal and Plastic 51-4052 - Pourers and Casters, Metal 51-4023 - Rolling Machine Setters, Operators, and Tenders, Metal and Plastic 51-4194 - Tool Grinders, Filers, and Sharpeners
Marketing Management and Research	13-1161 - Market Research Analysts and Marketing Specialists 11-2021 - Marketing Managers
Bartending	35-3011 - Bartenders