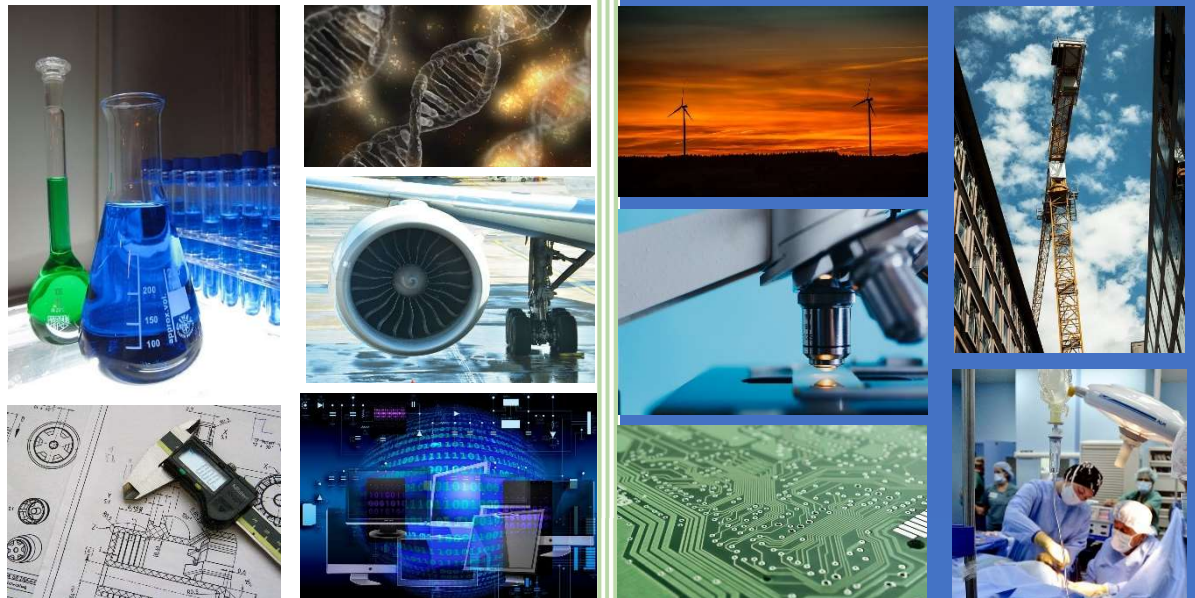




2021-22

Washington's Skilled and Educated Workforce



An analysis of postsecondary education, workforce preparation, and employer demand

A Joint Agency Report

Washington Student Achievement Council

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Executive Summary

Purpose of the Report

The Washington Student Achievement Council (WSAC) prepares this biennial analysis in collaboration with the State Board for Community and Technical Colleges (SBCTC) and the Workforce Training and Education Coordinating Board (Workforce Board) as part of a broader educational needs assessment, as required by RCW 28B.77.080. The report has three primary purposes: (1) to provide an overview of the current state of workforce preparation in Washington, (2) to identify the key drivers of employer demand in the various occupational fields, and (3) to highlight occupation fields in which students may find expanding employment opportunities.

Methods Used

The analysis is based on two primary measures: 1) *workforce supply*, estimates of the annual number of graduates entering the workforce by degree level and major field of study, based on Integrated Postsecondary Education Data System (IPEDS); apprenticeship, and vocational school administrative data; and 2) *employer demand*, forecasts of the number of net annual job openings by sector and education level, based on Emsi Burning Glass annual job projections.

Findings and Conclusions

Workforce Demand for Skilled Workers with Postsecondary Education Remains Strong

The middle skills level includes individuals with at least a year of college but less than a bachelor's degree. It includes those with associate degrees, certificates of one year or longer, and apprenticeship completers. The greatest workforce needs at this level are in production and trades; business, management, and sales; human and protective service; health professions; and computer and information technology. Demand in production and trades is led by jobs for automotive service technicians; heating, ventilation, and air conditioning (HVAC) mechanics; maintenance and repair workers, and skilled construction workers. In line with previous analyses, demand also remains strong for specific health occupations, led by jobs for licensed practical and registered nurses, home health and personal care aides, and medical and dental assistants. The main drivers of midlevel demand in computer and information technology are jobs for computer support specialists, database and network administrators, information security analysts, and web developers.

At the baccalaureate level, overall degree-completions in computer science, engineering, health, and other STEM fields have increased substantially from 2010 to 2020. Consistent with previous reports on education and the workforce in Washington, the greatest workforce demand at the baccalaureate level is in computer science and information technology, with jobs primarily going to software developers, programmers, systems analysts, information security analysts, and web developers. In the health field, expanding workforce needs and a shortage of registered nurses are primarily driving demand. Skilled workers in engineering are also in high demand, led by jobs in civil, electrical, industrial, and mechanical engineering. The prominence of demand in information technology and engineering reflects the key role that technology and innovation play in fueling the state's dynamic economic engine. Education is another occupational field at the bachelor's level with considerable workforce needs across the state. Demand is strong across a wide range of occupations, including kindergarten, elementary and middle school, secondary school, and special education teachers.

At the graduate and professional level, the occupations with the largest number of projected job openings are in computer science and health occupations. In the top group, demand is led by those for software developers, computer programmers, and systems analysts. In the health professions, strong demand at the graduate level is led by projected openings for physicians, physician assistants, physical therapists, dentists, pharmacists, healthcare diagnosing or treating practitioners, and advanced practice registered nurses.

Supply and Demand Comparisons in this Year's Report

Comparisons between annual certificate and degree completions and projections of annual job openings in this year's report show significant disparities. The differences between projected annual job openings and annual completions are larger this year than in previous reports in which we highlighted them. This is primarily due to the method the Bureau of Labor Statistics (BLS) is now using to estimate "separations," the numbers of workers who are leaving occupations and need to be replaced.

In addition to tracking separations associated with workers who follow the traditional route of working in an occupation for many years and then retiring, the new method also tracks replacement needs for workers who are relocating, switching jobs within an occupation, or simply changing occupations in mid-career. Overall, this new approach captures more of the shifting worker movement within and between occupations. It also yields much higher replacement numbers than the previous methodology and results in larger overall job opening projections.

Another factor that may be contributing to large differences between supply and demand in some fields is the impact of the tight labor market in the post-pandemic economic recovery. The prevalence of job openings in the current labor market may be encouraging some young people to skip postsecondary education or to stop out of programs and directly enter the workforce, thus suppressing enrollment numbers.

Degree and Certificate Completions in Key Fields Have Been Progressively Increasing to Meet Growing Demand

Over the course of recent years, continuous progress has been made in increasing degree and certificate production in high employer demand fields of study. Depending on the field and the educational level, progress in some areas has been more prominent than others and there has been some variability from year to year. But in all these key fields, degree production has moved in a positive direction during this time.

At the midlevel, certificates and degree completions in computer and information technology, engineering and related technology, and other STEM programs have risen sharply from 2016 to 2020, increasing by 43 percent. At the bachelor's level, degree production in health, computer and information technology, engineering and related technology, and other science and mathematics fields increased steadily in recent years, with a particularly sharp rise from 2018 to 2020. Completions have been rising steadily at the graduate level as well, particularly in the health and computer science fields.

Some of these increases were made possible by the expansion of institutional capacity. For example, in the field of computer science and information technology this was facilitated by the expansion of institutional capacity to take on more enrollments at places like the University of Washington Seattle, where the new Bill & Melinda Gates Center for Computer Science & Engineering opened in 2019.

However, despite overall progress during the last decade in increasing numbers of students completing degree programs, more gains are needed if we are to meet rising employer demand in a range of key fields. Significant employer workforce needs are seen at all education levels: middle skills, baccalaureate, and graduate. Among the areas facing the greatest workforce pressures are the STEM fields, particularly in computer science and information technology and health. Education is also facing recruitment and retention challenges in high-need fields—in areas like science, math, and special education—and in hard-to-staff schools and districts.

The Post-Covid Economic Recovery: Reasons for Optimism and Caution

The current post-covid economic recovery in Washington appears strong but there are signs that we are not out of the woods yet. The state unemployment rates have come down from a high of 8.9% in mid-2020 to 5.5% in May 2021 and 3.9% in May 2022. But this is still higher than the national rate, which was 5.8% in May 2021 and 3.6% in May 2022. As of May 2022, Washington has fully recovered or is on track to fully recover all jobs lost during the pandemic. This is contributing to a tight labor market. However, the state economy is still showing some volatility. On a seasonally adjusted basis, preliminary estimates from the federal Bureau of Labor Statistics (BLS) indicate nonfarm employment in Washington fell by 2,300 in May 2022.

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Background

Purpose of the Report

This report has three primary purposes: (1) to provide an overview of the current state of workforce preparation in Washington, (2) to identify the key drivers of employer demand in the various occupational fields, and (3) to highlight occupation fields in which students may find expanding employment opportunities. This report focuses on projected workforce needs for the period from 2024 to 2029.

The Washington Student Achievement Council (WSAC) prepares this analysis in collaboration with the State Board for Community and Technical Colleges (SBCTC) and the Workforce Training and Education Coordinating Board (Workforce Board) as part of a broader educational needs assessment. The goal, as outlined in RCW 28B.77.080, is to determine “the number of forecasted net job openings at each level of higher education and training, and the number of credentials needed to match the forecast of net job openings.”

The report is also used in the state’s broader educational planning. As part of its Roadmap initiative, WSAC has established a coordinated, long-term strategy to increase educational attainment in the state. It has identified key challenges and priorities the state must address and prepares regular strategic action plans and progress reports in furtherance of these goals. Among the key challenges in the plan are meeting Washington’s workforce demand and ensuring that the state’s residents have the training and education they need to compete for good, high-paying jobs in the state’s dynamic, innovative, technology-based economy.

Similarly, SBCTC and the Workforce Board use the report in their strategic planning, focusing on meeting Washington’s needs for midlevel education. This includes apprenticeships, certificate programs, and associate degrees.

Current National Context

National Education and Workforce Trends

A Surging Gig Economy Poses a Challenge for Postsecondary Education

The number of gig workers in the United States surged in 2021, from 38 million to 51 million workers—a 34 percent increase.¹ It is difficult to predict at this point exactly how the economy will respond once the COVID-19 pandemic subsides, but studies indicate that the gig economy will likely continue to employ somewhere between a quarter to a third of workers for the foreseeable future.² The ability to fare well in gig-based work often depends on the type of gig work in question and on specific factors that dictate a person’s individual bargaining power in the labor market. Gig work can be very lucrative for some workers, particularly freelancers with advanced degrees who earn good money while benefiting from the flexibility and autonomy that comes with being an independent contractor. But many other workers tend to struggle financially because they find themselves stuck in low-wage, dead-end gig jobs.

Freelancers may possess valuable and adaptable technical skills, such as coding, graphic design, or multimedia production, but their education often does not include information on how to set up a limited liability corporation, what to do if clients don't pay, or how to get health insurance. In response to this skills gap among freelance workers, California's Community College System developed its Self-Employment Pathways in the Gig Economy Pilot Project. Participating colleges were tasked with designing and delivering a series of professional development courses focused on how to run a small business. Topics to be covered included licensing, insurance, taxes, and business planning, all essential subjects one needs to master to be successful as an independent contractor.



Community colleges can play an important role in helping current and prospective gig workers understand and navigate the gig economy to be successful in it.

- New America

Earnings Generally Increase with More Education but Income Varies Substantially Depending on Field of Study and Occupation

National studies have shown that postsecondary education, in general, tends to pay off in the labor market.³ With each additional level of education, workers typically earn more throughout their lifetimes. However, not all workers with higher levels of education earn more than all workers with less education. Other factors—from field of study and occupation to gender, race and ethnicity, and location—drive differences in earnings. The more reliable route to a high-paying career now requires mixing postsecondary education with the right combination of those factors, plus skills and experience. In other words, postsecondary education has become more valuable in the workforce, but its value is also part of a complex equation.



Much of the variation in earnings within education levels results from differences in field of study and occupation

- Georgetown Center on Education and the Workforce

Completing high school puts workers on track to earn a median of \$1.6 million during their lifetimes, roughly 33 percent more than the \$1.2 million that they would earn if they had not graduated (Figure 1). The payoff increases with each additional level of education. At the median, those with some college education but no degree earn \$1.9 million during a career, averaging \$47,500 per year. This is an earnings boost of about 19 percent over high school diploma holders. An associate degree increases lifetime earnings over a high school diploma by 25 percent. Associate degree holders earn a median of \$2 million during their lifetimes, averaging \$50,000 per

year. Today, workers with bachelor's degrees earn 75 percent more than those with no more than a high school diploma. A bachelor's degree holder earns, at the median, \$2.8 million during a lifetime, which translates into average annual earnings of about \$70,000. And median lifetime earnings continue to rise with attainment of master's, doctoral, and professional degrees.

However, even though workers with more education tend to earn more, there is substantial variation in earnings at each level of education. A higher level of education does not guarantee higher earnings, while less education does not always result in lower earnings. For example, workers with no more than a high school diploma make \$2.2 million in lifetime earnings at the 75th percentile—more than the median for workers with an associate degree (Figure 2). In other words, at least one quarter of high school diploma holders without additional education earn more than half of the workers with associate degrees. Likewise, at the 75th percentile, workers with an associate degree earn \$2.9 million over their lifetimes, more than the median for a worker with a bachelor's degree. This means that at least one quarter of workers with an associate degree earn more than half the workers with a bachelor's degree. At the 75th percentile, those with a bachelor's degree earn \$4.1 million over their lifetimes, more than the median for workers with a master's or doctoral degree. In other words, at least one quarter of workers with a bachelor's degree earn more than half of the workers with master's or doctoral degrees over their lifetimes. Much of the variation in earnings within education levels results from differences in field of study and occupation.⁴

Demand for Non-Degree Credentials Continues to Rise but Labor Market Outcomes are Mixed National trends show that non-degree credentials are becoming a large and growing segment of higher education.⁵ In the first decade of the 21st Century, the number of short-term certificates awarded by community colleges across the United States increased by more than 150 percent.⁶ By 2010, 41 percent of all credentials awarded by community colleges were non-degree certificates.⁷ Over the following decade, the number of certificates awarded by all public colleges increased by nearly 30 percent. This trend coincides with overall increases in the postsecondary attainment of Americans. As much as one-quarter of the workforce has a noncredit certificate, license, or another vocational award.⁸

For most students, the primary reason they enroll in postsecondary education is to qualify for a good job that pays well with benefits. Older, working-age adults often return to education to gain skills so they can reskill or upskill for a new job. And many are attracted to short-term certificates to accelerate the process. Short-term certificates typically require less than one year of full-time study and long-term certificates require more than one year. However, national studies of labor-market returns for certificate programs have shown mixed results. Research has consistently found that long-term certificates do increase workers' odds of being employed, but short-term certificates vary in their effectiveness at ensuring employment. Moreover, national survey data show that earnings increases and employment rates among certificate-holders (77 percent) are lower than rates among their peers who completed either an associate or bachelor's degree (84 and 87 percent, respectively).⁹



Short-term certificates – those requiring less than one year of full-time studies - show relatively low labor market returns, with benefits that often wane within a few years of earning the credential.

- New America

Short-term certificates show relatively low labor market returns, with benefits that often wane within a few years of earning the credential. The value of these credentials are substantially enhanced when they are stackable toward more advanced certificates and degrees.¹⁰

The Pandemic Resulted in Workplace Changes¹¹ That Are Transforming IT Occupations¹²

Before the onset of the COVID-19 pandemic in 2020, many IT jobs were already anticipated to be in high demand over the next decade. As a result of changing workplace environments affected by the pandemic, IT workers have become even more important to the future economy, with employment projections showing increasing demand for these occupations. Since the pandemic began, employers have increased remote and hybrid work arrangements, e-commerce has surged, and the availability of telemedicine and telehealth services has greatly expanded. These trends require enhanced and sophisticated cybersecurity solutions, and therefore more computer experts. The U.S. Bureau of Labor Statistics (BLS) 2020–30 employment projections show that, nationally, the following occupations will be the fastest growing computer occupations: information security analysts; software developers, quality assurance analysts, and testers; computer and information research scientists; and web developers and digital interface designers.¹³

The spread of remote and hybrid workplace arrangements, telehealth medical services, e-commerce, and app-based services will have a long-term impact on IT demand.

The COVID-19 pandemic has changed how people work, receive healthcare, and shop, and these changes will drive more demand for computer occupations. The spread of remote and hybrid workplace arrangements, telehealth medical services, e-commerce, and app-based services will have a long-term impact on IT demand. A growing digital economy, consumers and businesses demanding more connectivity to and services from the internet, and an overall increased focus on data

THE POST-COVID ECONOMIC RECOVERY: REASONS FOR OPTIMISM AND CAUTION

The current post-covid economic recovery in Washington appears strong but there are signs that we are not out of the woods yet. The state unemployment rates have come down from a high of 8.9% in mid-2020 to 5.5% in May 2021 and 3.9% in May 2022. But the statewide rate is still higher than the national, as shown in the chart below.

UNEMPLOYMENT RATES

	May 2022	May 2021
United States	3.6%	5.8%
Washington	3.9%	5.5%
Seattle Area	2.7%	4.8%

Source: ESD Monthly Employment Reports

As of May 2022, Washington has fully recovered or is on track to fully recover all jobs lost during the pandemic. However, the state economy is still showing some volatility. On a seasonally adjusted basis, preliminary estimates from the federal Bureau of Labor Statistics (BLS) indicate nonfarm employment in Washington fell by 2,300 in May 2022.

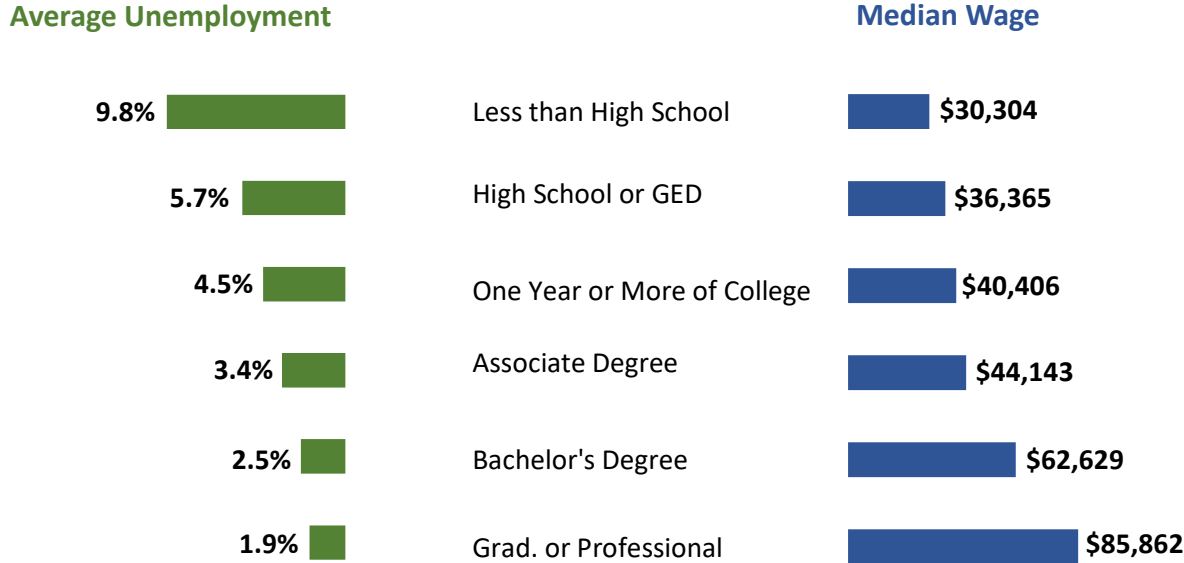
security are all expected to contribute to robust long-run demand for these workers. As workers rely even more upon IT infrastructures to do their work, developers and testers will be needed to enhance platforms and systems. And, as systems become more sophisticated, cybercriminals and hackers tend to adapt and match this sophistication. IT cyber security professionals are likely to see growing demand to secure increasingly valuable and private information.¹⁴

Key Indicators of Demand

Workers' Education Levels Affect Both Wages and Unemployment

Two important indicators of demand for educated workers are 1) the effect of educational attainment levels on wages and unemployment rates and 2) the rate of in-migration of educated workers to Washington from other states and nations. In Washington, mirroring national trends, we see a stable and consistent relationship between these indicators and education level. On average, earnings tend to rise, and unemployment rates decline with additional years of formal training and education.

Figure 1. Unemployment and Wages in Washington (Age 25-44)



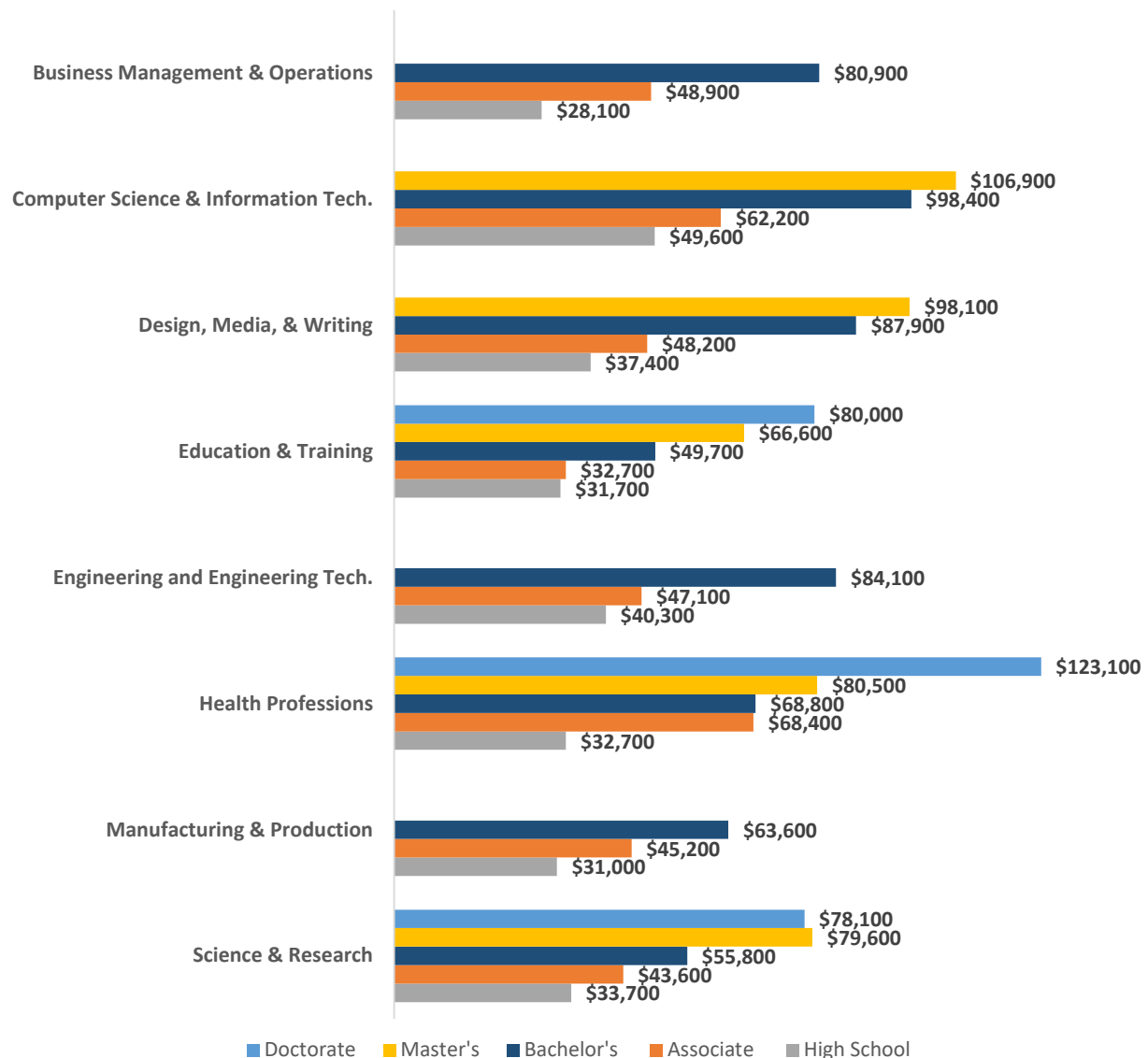
Sources: Unemployment rates - Emsi Burning Glass, based on U.S. Census Bureau 2015-19 American Community Survey and Local Area Unemployment Statistics (LAUS). Wages - American Community Survey, 1-Year PUMS data, 2019.

Figure 1 illustrates this trend. The age span of 25 to 44 was chosen for two reasons: 1) it covers a set of individuals who are potential long-term participants in the state's workforce, and 2) individuals in this group are at an age when they could see a strong return on investment from further education. This relationship holds when looking at occupations as well. Earnings tend to differ depending on occupation but also differ by education level within occupational groups.

Education Levels and Occupations are Major Determinants of Wages

Certain occupations—such as those in engineering, the health professions, and information technology—yield higher wages overall than less technically oriented fields. But in most occupational clusters, workers experience significant growth in income with additional years of formal training (see Figure 2). For example, in the field of computer science and information technology, median wages escalate from about \$62,000 for workers at the midlevel (associate degree or a year or more of college) to over \$98,000 for those with a bachelor’s degree and \$107,000 with a graduate degree. A similar pattern of progressive wage increase with higher levels of education is seen in all occupations.

Figure 2. Washington Median Wage by Occupational Category and Education Level



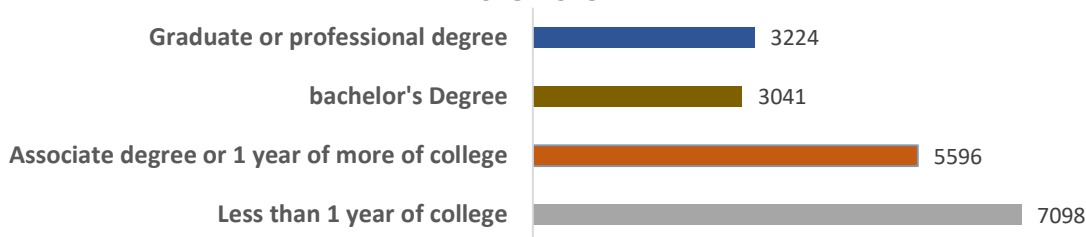
Source: Emsi Burning Glass, estimates based on job postings data, April 2021 – March 2022.

However, some variation is also seen in the range of education-linked wage increases. In some fields—such as the health professions, computer science, and engineering, the wage impact seen at the bachelor’s and graduate and professional degree levels is particularly pronounced. In others the wage differential is relatively flattened out. This is true for some of the occupations for which specific skill sets are less defined.

Net In-Migration: Washington Attracts Many Workers from Other States

Although the COVID-19 pandemic created a temporary economic downturn with an uncertain future beginning in 2020, Washington has had a strong economy and a growing population in recent years. Consequently, it’s not surprising that we have had a fair amount of in-migration. But, beyond this general trend, Washington relies heavily on workers with postsecondary credentials obtained in other states to meet employer workforce needs. To be sure, a percentage of our graduates decide to move to other states after completing their degrees. But, overall, more college-educated workers tend to migrate into the state than Washingtonians decide to move elsewhere. Between 2015 and 2019, Washington attracted a net of almost 19,000 workers with at least some postsecondary education (see Figure 3). That includes over 7,000 workers with up to a year of postsecondary education, over 5,700 with an associate degree or one year or more of college, and more than 6,000 with a bachelor’s or graduate degree.

Figure 3. Washington's Net In-Migration by Education Level
2015-2019



Source: WSAC Staff Analysis of 2015-2019 American Community Survey Data.

These numbers reveal substantial in-migration from just state-to-state exchanges alone, without accounting for international workers who choose to move here. This statistic highlights the challenge that Washington employers are facing in finding qualified skilled workers and reveals that many are hiring those who have been educated in other states to fill openings.

These trends help set the context for the analysis of supply and demand of skilled and educated workers in Washington. It should be noted, however, that although in-migration has been a key source of talent in Washington in recent years, in-migration counts were not included in the supply analysis for this report.

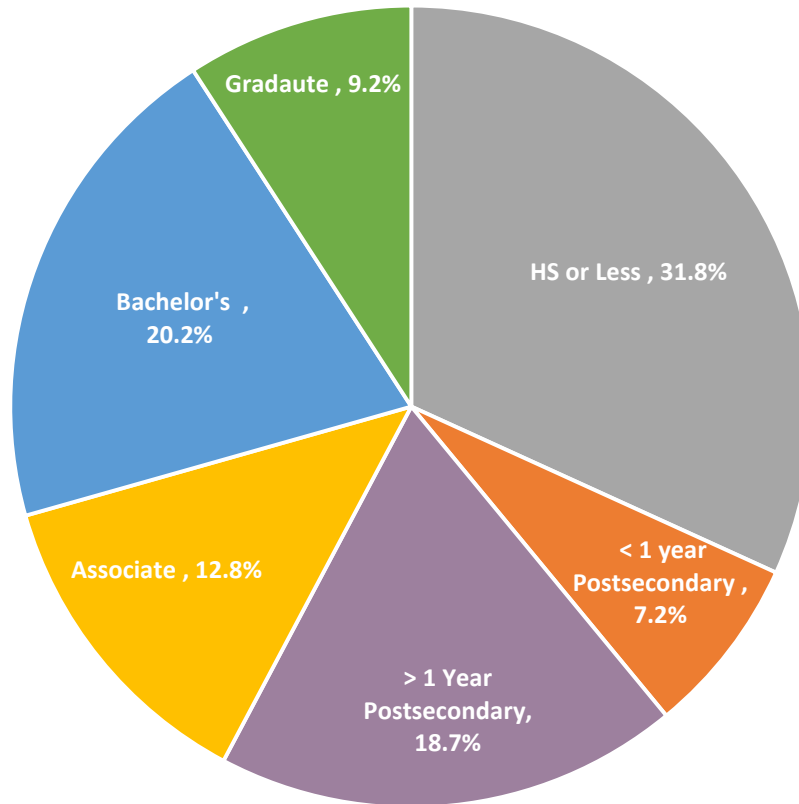
Employment Projections Show Continuing Strong Demand for Workers with Postsecondary Credentials

The trend toward increasing complexity in the workplace and the need for more skilled and educated workers, as observed in recent national studies, are clearly reflected in Washington’s employment outlook. As shown in Figure 4, a clear majority of all projected job openings for 2024-2029 will require at least some education beyond high school (nearly 70 percent). Sixty percent

will require at least a year or more of postsecondary training. Around 32 percent of open positions will call for workers educated at the middle-skills level. This category includes postsecondary education leading to an apprenticeship, one year or more of postsecondary education, training certification, or an associate degree. Demand for workers with bachelor's and graduate degrees is also projected to be strong. Overall, nearly 30 percent of employment opportunities will be aimed at workers who have bachelor's degrees or above, with about 20 percent of openings requiring a baccalaureate and over 9 percent requiring graduate-level education.

At the other end of the spectrum, the percentage of projected openings for workers with a high school education or less is around 32 percent. During the recession caused by the COVID-19 pandemic, low-skill, low-wage workers experienced the worst job losses. Many of these jobs required on-site work or in-person contact with customers and were not easily transitioned to remote work. They were also the slowest to return as the labor market began to rebound.¹⁵ But with the current steady economic recovery, these low-skill jobs are on the rise.

**Figure 4. Total Projected Openings by Education Level
2024-2029**



Source: WSAC Analysis of Emsi Burning Glass estimates of projected annual openings 2024 - 2029; Washington State Employment Security Department, 2021 Long-Term Employment Forecast for 2024-2029. Education Levels based on analysis of the U.S. Census Bureau 2015-19 American Community Survey.

Workforce Supply and Demand Comparisons Show Opportunities for Skilled Jobseekers

In this year's report, the comparison between annual completions of credential programs and projected annual job openings in the various occupations show continuing strong demand for workers with postsecondary credentials and opportunities for skilled jobseekers.

SUPPLY AND DEMAND COMPARISONS IN THIS YEAR'S REPORT

The comparison between projected annual job openings and annual completions show larger disparities this year than in previous reports in which we highlighted them. This is primarily due to the method the Bureau of Labor Statistics (BLS) is now using to estimate "separations," the numbers of workers who are leaving occupations and need to be replaced.

In addition to tracking separations associated with workers who follow the traditional route of working in an occupation for many years and then retiring, the new method also tracks replacement needs for workers who are relocating, switching jobs within an occupation, or simply changing occupations in mid-career. Overall, this new approach captures more of the shifting worker movement within and between occupations. But it also yields much higher replacement numbers than the previous methodology and results in larger overall job opening projections.

Understanding the Comparisons

The large disparities between completions and projected openings in this year's report should be interpreted differently than the gaps highlighted in previous reports. In previous reports, up through 2017, the BLS was using a different methodology to estimate separations, which took a more limited approach to tracking them, focused primarily on retirements. This yielded more limited projection numbers for annual job openings and smaller gaps between credential completions and job openings. In this context, we were able to use them to roughly estimate the number of additional annual graduates that would be needed to fill job openings in each occupational category at each educational level. And

ELEMENTS OF DEMAND ANALYSIS

In this analysis, the demand figures are based on Emsi Burning Glass projections of annual job openings for 2024-2029, which estimate openings due to industry growth or to worker replacement needs.

Growth. An opening produced as the result of growth is generated when an employer hires a new worker in a particular occupation to keep up as growing workloads exceed capacity. Estimates of openings due to growth are based on job count data.

Replacement Need. Openings are also created when a worker leaves a particular occupation, due to retirement or a decision to relocate, switch jobs within the same occupation or change careers to a new occupation. Openings due to replacements are calculated by applying the Bureau of Labor Statistics' separation rates to job counts.

See Appendix for more details on the analytic methodology.

we were able to compare the gap figures from year to year on this common scale. With the BLS’s new methodology, however, the scale is entirely different, and the year-to-year comparisons with the older gap figures are no longer viable. For this reason, in the 2019-20 report, we decided to present projected opening numbers separately from the annual completions figures to avoid confusion on this point.

But for this year’s report, we decided to return to presenting the openings and completions numbers together, because it provides a valuable perspective. However, one should be careful in understanding the large supply and demand disparities. The projected annual job opening numbers that exceed the annual completion numbers should not be interpreted as representing a precise number of additional program graduates that are needed to meet demand in each occupational cluster. Their value is in providing a general sense of the projected scale of annual openings in the various occupational fields and the employment opportunities they represent.

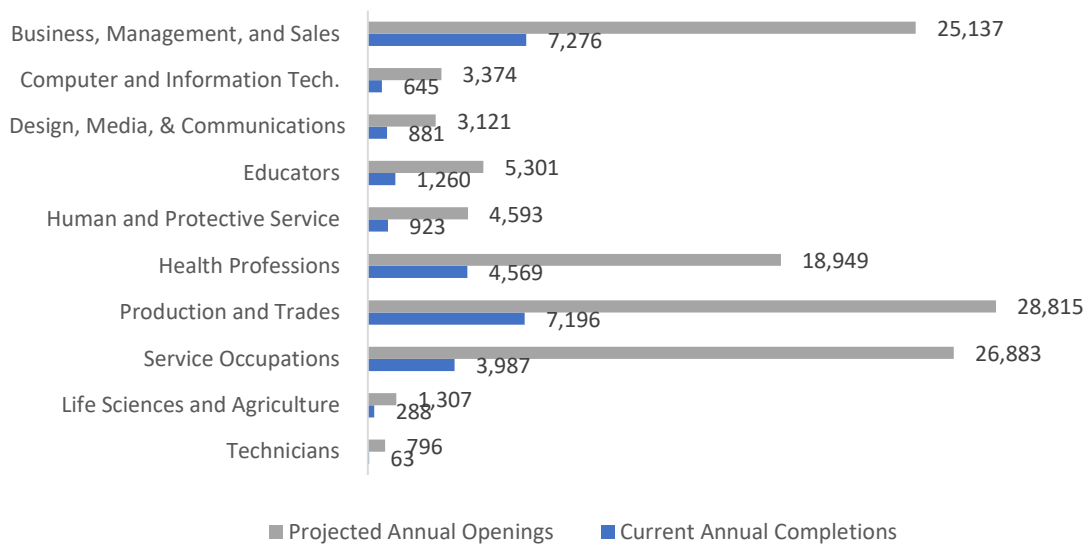
Projected Annual Job Openings and Completions

At each of the three education levels - middle skills, baccalaureate, and graduate - certain occupational clusters stand out with large projected annual job opening numbers compared to annual completions. The differences reveal the extent of job opportunities that are available as the result of workers switching to new jobs within occupational fields, changing occupations, or retiring, in addition to industry growth.

The Middle Skills Level

The midlevel supply includes two-year degree graduates. It also includes completers of long-term certificates and apprenticeships from the community and technical colleges and private career schools.

**Figure 5. Projected Midlevel Supply and Demand Comparison
2024-2029**



Source: WSAC, WTECB, SBCTC joint analysis of Emsi Burning Glass projected job openings for 2024-2029, Q2 2021 Data Set; 2021 Washington ESD long-term employment forecast; Bureau of Labor Statistics Training levels; IPEDS; 2019 Census PUMS data.

Large Differences Between Supply and Demand Numbers. One factor that may be contributing to large differences between supply and demand in some fields at the midlevel is the impact of the tight labor market in the post-pandemic economic recovery. The prevalence of job openings in the current labor market may be encouraging some young people to skip postsecondary education or to stop out of programs and directly enter the workforce, thus suppressing enrollment numbers.¹⁶

Key Drivers of Demand - Midlevel

The major occupational groups that are driving demand at the midlevel are shown in Figure 5. The largest numbers of projected jobs are seen in production and trades; service occupations, business, management, and sales; and health professions.

Production and Trades. This includes occupations in a wide range of fields, including construction, manufacturing, mechanics, equipment operation, and maintenance and repair. Demand in this cluster is led by jobs for automotive service technicians; heating, ventilation, and air conditioning (HVAC) mechanics; maintenance and repair workers, skilled construction workers, and millwrights (skilled tradespersons who install and maintain machinery in factories).



Business, Management, and Sales. Demand in this field at the midlevel is led by job openings for general and operations managers, business operations specialists, construction managers, frontline supervisors of retail sales workers, and human resource specialists.

Human and Protective Services. The leading occupations driving demand at the midlevel for skilled workers in this cluster are police officers, transportation security screeners, counselors, and social workers.

Computer and Information Science. Job projections remain strong for skilled workers with associate degrees in computer and information technology. This includes entry-level positions for recent graduates, as well as more advanced positions for those with work experience in addition to a two-year degree. Demand is led by jobs as computer support specialists, database and network administrators, information security analysts, and web developers.

Life Sciences and Agriculture. Most midlevel jobs in life sciences and agriculture are for technicians in the fields of life, physical, and social sciences, and in biology.

Education. Demand for educators at the midlevel are led by jobs as teacher assistants, preschool teachers, and library technicians. For more information on the educator shortage in Washington, see further discussion beginning on page 16.

The Health Field at the Midlevel. Another key occupational area with workforce needs at the middle skills level is in healthcare. As in previous reports, demand remains strong for licensed practical and registered nurses, home health and personal care aides, and medical and dental assistants.

The Washington State Health Workforce Sentinel Network reported in Fall 2021 that medical assistants, licensed practical nurses, and registered nurses were among the top occupations for which clinics, hospitals, and nursing facilities are experiencing exceptionally long vacancy times.¹⁷ Among the key reasons presented for these vacancies were difficulties finding qualified candidates in rural areas. Vacancies were particularly acute in less-populated regions where no schools with degree programs in these health fields are locally available.



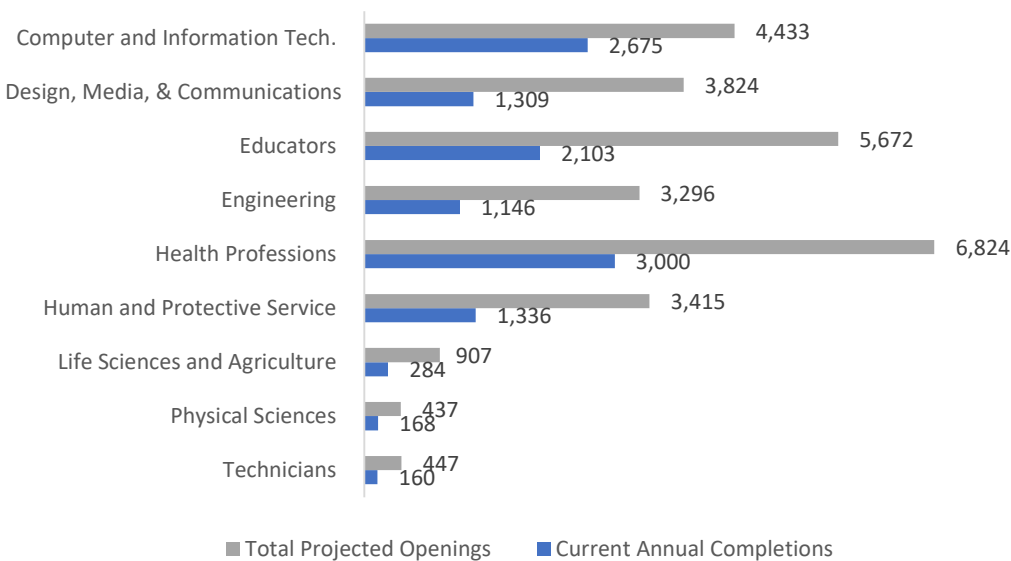
The Baccalaureate Level

Figure 6 shows the major workforce supply and demand comparison at the baccalaureate level. Many of the same occupational clusters highlighted in previous reports also appear in this year’s analysis.

Key Drivers of Demand – Bachelor’s Level

Leading the fields with the largest number of projected annual job openings are computer science and information technology, engineering, and health professions. This reflects the expanding role that technology and innovation play in fueling the state’s dynamic economic engine. Education is another occupational field in which demand is outpacing the supply of qualified people to fill job openings.

Figure 6. Projected Bachelor's Supply and Demand Comparison 2024-2029



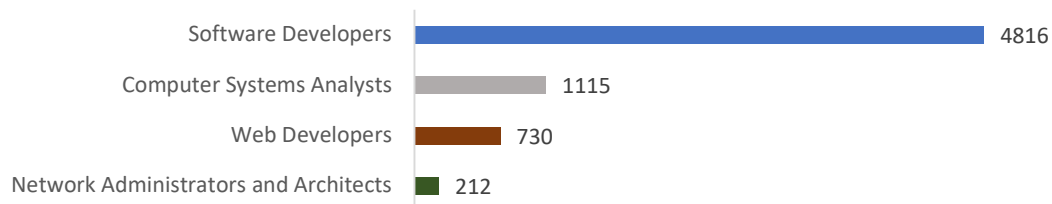
Source: WSAC, WTECB, SBCTC joint analysis of Emsi Burning Glass projected job openings, 2024-2029, 2021 Washington ESD long-term employment forecast; Bureau of Labor Statistics Training levels; IPEDS; 2019 Census PUMS data.

Computer Science. Employer demand for workers with computer science skills at the baccalaureate level is strong across the field. However, skilled-worker needs are especially strong in certain occupations. As shown in figure 7, in the field of computer science, nearly 57 percent of projected openings are for software developers, followed by computer systems analysts (13 percent) and web developers (9 percent). This exceptionally strong demand for software developers is consistent with national trends, which show that demand in this occupational field roughly doubled in 2021.¹⁸

Overall, the broad-based need for workers educated and skilled in computer science seen in this data reflects not only the state’s innovative economic spirit, but also the extent to which companies are generally incorporating digital technology in the workforce. The deep demand for individuals with software development skills specifically reflects the dynamic nature of Washington’s computer and technology industries. Software developers focus on analyzing user needs and designing software to perform a given range of required functions. This field includes systems software developers, who specialize in computer operating systems, and applications software developers, who focus on various applications, such as games, video editors, word processors, and databases. Computer programmers, on the other hand, focus on writing code using the specifications that software developers have designed. The persistent stress on the need for software developers in the state reveals a strong innovative and cutting-edge approach in the state’s core technology industries.



**Figure 7. Top Computer and Information Technology Jobs
Bachelor's Level
Projected Annual Openings 2024 - 2029**

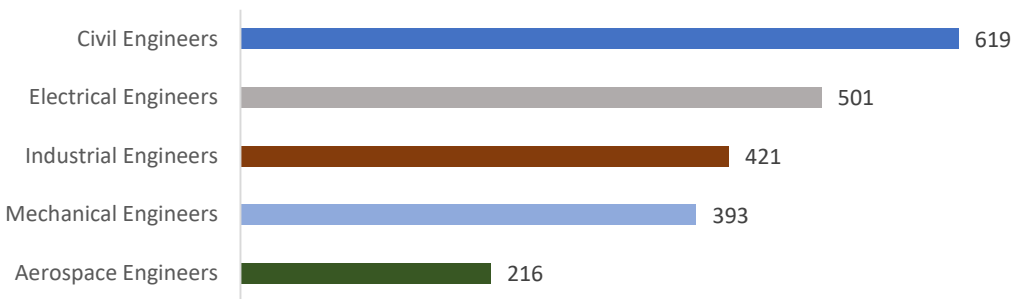


Source: WSAC, WTECB, SBCTC joint analysis of Emsi Burning Glass projected job openings, 2024-2029, 2021 Washington ESD long-term employment forecast; Bureau of Labor Statistics Training levels; IPEDS; 2019 Census PUMS data.

Engineering. Similarly, demand for engineers is strong across all areas of specialization. But some areas stand out. Nineteen percent of projected openings are for civil engineers. This, in part, reflects the strong surge in construction the state is currently undergoing, accompanying a sustained upswing in the economic recovery. Rounding out the list of occupations with the highest employer demand at

the baccalaureate level are electrical engineering (15 percent), industrial engineering (13 percent), mechanical engineering (12 percent), and aerospace engineering (7 percent).

**Figure 8. Top Engineering Jobs
Bachelor's Level
Projected Annual Openings 2024 - 2029**



Source: WSAC, WTECB, SBCTC joint analysis of Emsi Burning Glass projected job openings, 2024-2029, 2021 Washington ESD long-term employment forecast; Bureau of Labor Statistics Training levels; IPEDS; 2019 Census PUMS data.

Education. At the baccalaureate level, demand is strong across a wide range of education occupations, including kindergarten, elementary and middle school, secondary school, and special education teachers.

Human and Protective Services. Demand in the field of human and protective services at the baccalaureate level is primarily driven by jobs in a few key fields. In the top group are openings for counselors and social workers. Employment growth in this field is primarily driven by increased demand for healthcare and social services. Social workers, for example, help people cope with a wide range of problems. They are employed in a variety of settings, including mental health clinics, schools, child welfare and human service agencies, and hospitals. One group of social workers—clinical social workers—also diagnose and treat mental, behavioral, and emotional issues.

Physical Sciences. Demand in the physical sciences occupational cluster is tied to the strength of Washington’s research and innovation communities. The leading occupations in this field are in environmental and geoscience, chemistry, and materials science. Environmental scientists conduct research to identify, control, or eliminate sources of pollutants or hazards affecting the environment or public health. Geoscientists address critical questions affecting a range of issues, including energy, weather and climate, water, and mineral resources. Materials scientists incorporate elements of physics, chemistry, and engineering in cutting-edge research and development in areas such as nanotechnology and composites.

Design, Media, and Communications. Demand in media, design, and communications was led by jobs for designers. Graphic designers are a key component of this occupational cluster, using computer software to create visual displays for production design, or to communicate concepts that inspire, inform, and captivate consumers.

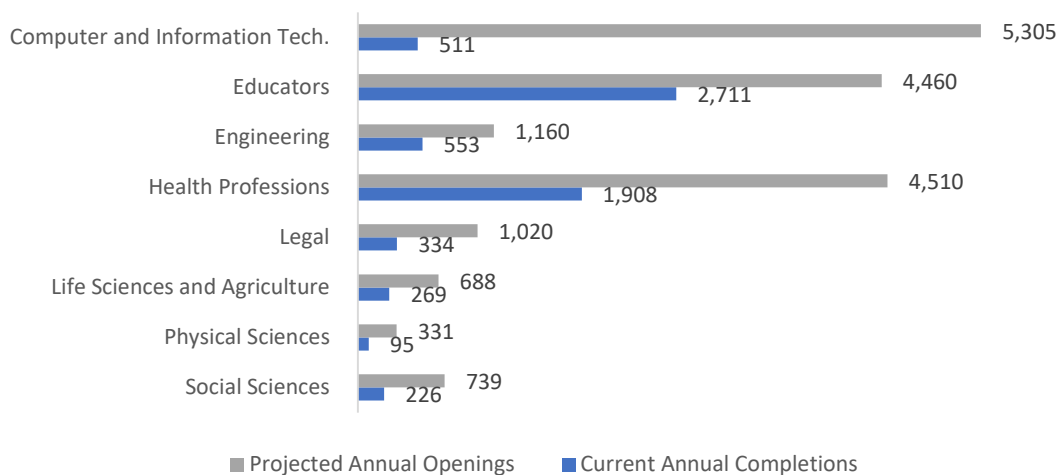
Life Sciences and Agriculture. Projected openings in life sciences and agriculture at the baccalaureate level are led by jobs for biologists, conservation scientists, and foresters.

The Graduate and Professional Level

Key Drivers of Demand – Graduate Level

The greatest workforce demand at the graduate level is in computer science and the health professions (see Figure 9). Other occupational clusters in which there are workforce needs are education; engineering; physical sciences; and life sciences and agriculture.

Figure 9. Projected Graduate Supply and Demand Comparison 2024-2029



Source: WSAC, WTECB, SBCTC joint analysis of Emsi Burning Glass projected job openings, 2024-2029, 2021 Washington ESD long-term employment forecast; Bureau of Labor Statistics Training levels; IPEDS; 2019 Census PUMS data.

Computer Science. By far, the occupational field showing the most demand at the graduate level is computer and information science. Demand for workers in this field with graduate-level education is strong, with over 5,300 openings projected per year through 2029. In comparison, just over 500 students each year are completing graduate programs prepared to fill those openings.

Overall, some of the same occupations that drive demand at the baccalaureate level also lead the field here; however, there are key differences. At the graduate level, software developers are particularly in high demand. Employment opportunities for computer systems analysts are also significant. The greater demand for software developers at the graduate level reflects a central hierarchy in the profession. In general, software developers operate at a higher level. They design the fundamental software, and computer programmers write code to their specifications. Given a strong need for individuals in this area, employers tend to prefer those with graduate-level training. However, even though a few specific occupations in the field tend to lead the pack, demand remains strong across the spectrum in computer science.

Health Professions. As highlighted in previous reports, there is consistent demand at the graduate level for health professionals. Nearly 20 percent of projected openings are for physicians and surgeons. Other occupations that figure prominently in projected job openings include physical therapists (10 percent), pharmacists (8 percent), and dentists (7 percent). See page 18 for a more detailed discussion of demand in the health field.

Educators. Projected openings in the education field at the graduate level are highest for elementary, middle, and secondary school teachers. See page 16 for further discussion of workforce demand in education.

Engineering and Related Technology. Demand for workers with graduate degrees in the engineering field is led by jobs for civil engineers, driven largely by strong growth in the construction industry in many parts of the state.

A Closer Look at Demand in Two Key Fields

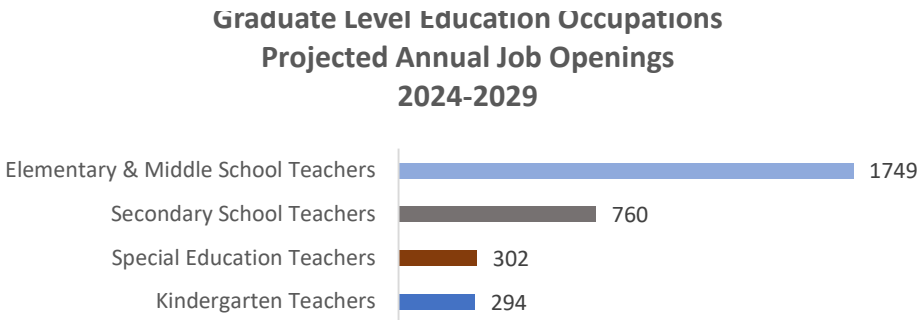
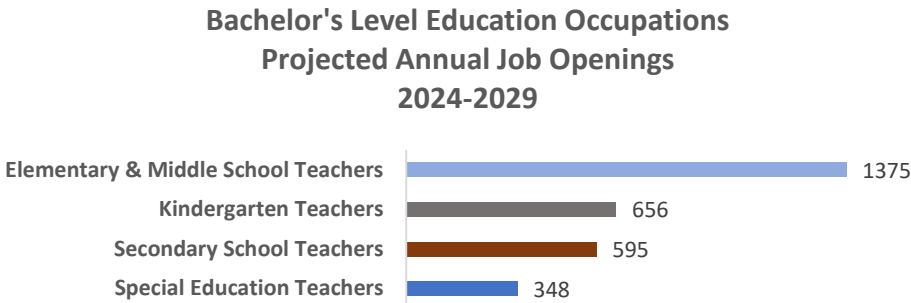
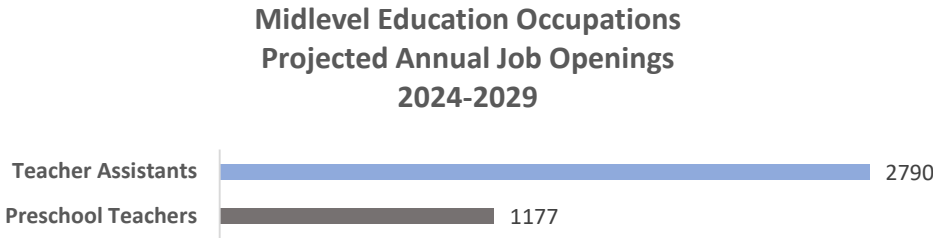
Education

In 2022, workforce demand in education is significant at all education levels. Figure 10 shows projections of annual job openings for the top occupations at the midlevel, bachelor's degree, and graduate degree levels. At the midlevel, demand is led by jobs for teacher assistants, preschool teachers, and library technicians. At both the bachelor's and graduate degree levels, demand is strongest for elementary and middle school teachers, with nearly 25 percent of openings for educators at the bachelor's level and more than 30 percent of openings at the graduate level. Demand is also strong for secondary and Kindergarten teachers. As with healthcare, certain areas of the state face greater challenges in meeting educator needs. Low-income urban school districts and rural areas of the state are often the hardest hit, facing persistent challenges with high teacher turnover rates.¹⁹

The Professional Educator Standards Board reports that steady progress is being made to reduce the educator shortage in Washington, but challenges remain in key areas. Across the state, there continues to be a serious shortage of educators who reflect the diverse demographics of P-12 students. Educators in the areas of special education and English Language Learners (ELL) are also in short supply. And rural areas and some urban districts continue to face challenges in keeping qualified teachers.²⁰



Figure 10. Projected Openings in Education



Source: WSAC, WTECB, SBCTC joint analysis of Emsi Burning Glass projected job openings, 2024-2029, 2021 Washington ESD long-term employment forecast; Bureau of Labor Statistics Training levels; IPEDS; 2019 Census PUMS data

PESB has recommended several strategies to address these shortages, including increasing equitable pathways into the education profession, supporting incentives for candidates pursuing certification in shortage areas, removing policy and institutional barriers to paraeducators entering the teaching field, and increasing incentives for professional learning that support persistence and retention.

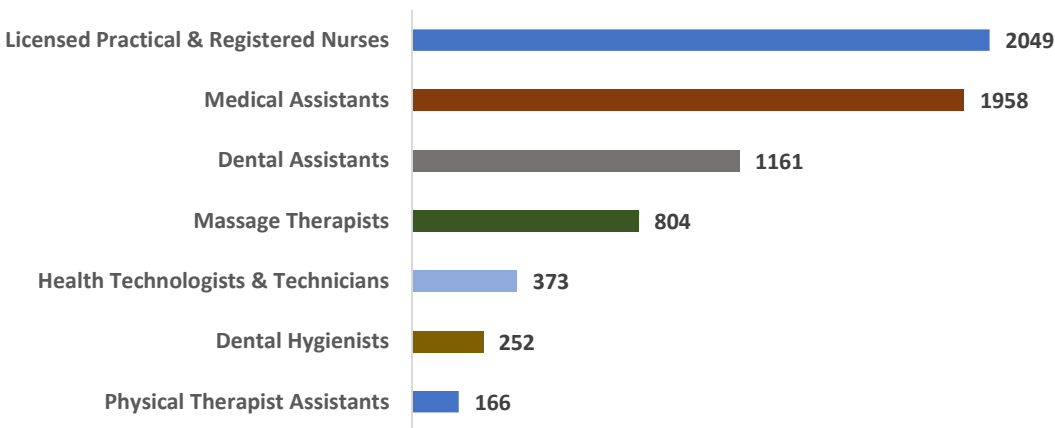
Health

Health is another field with salient workforce demand. As in education, this is true across all education levels, with a need for skilled workers trained at the midlevel, baccalaureate, and graduate & professional.

Midlevel. Figure 11 shows health occupations with the highest number of projected annual job openings. The health occupation in highest demand at the midlevel is licensed practical and registered nurses, representing nearly 20 percent of all annual projected job openings. Medical assistants are the next highest in demand, followed by health technologists and technicians, massage therapists, dental assistants, and dental hygienists.



**Figure 11. Top Health Occupations
Projected Annual Job Openings at Midlevel
2024-2029**

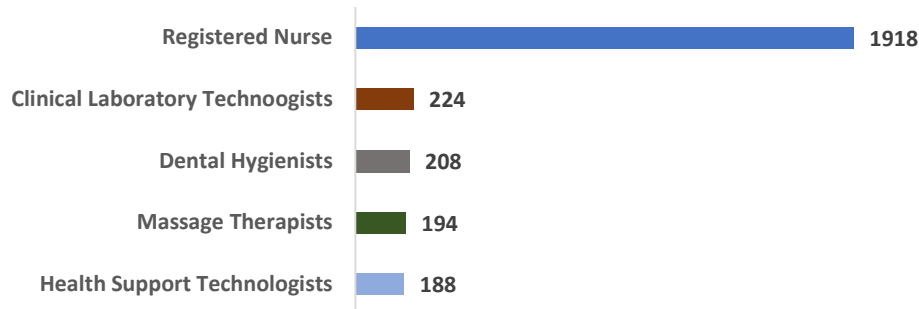


Source: WSAC, WTECB, SBCTC joint analysis of Emsi Burning Glass projected job openings, 2024-2029, 2021 Washington ESD long-term employment forecast; Bureau of Labor Statistics Training levels; IPEDS; 2019 Census PUMS data.

Bachelor's Level. Figure 12 shows the health occupations with the highest number of projected annual job openings. Among all projected openings for health professionals with bachelor's degrees, 42 percent are for registered nurses. Demand is growing in many regions of the state for registered nurses with bachelor's degrees, as clinics and hospitals increasingly look to hire

individuals with a broader range of specialized skills. There are also significant workforce needs for trained dental hygienists, skilled clinical laboratory, health support, and diagnostic technologists.

**Figure 12. Top Health Occupations
Projected Annual Job Openings at Bachelor's Level
2024-2029**



Source: WSAC, WTECB, SBCTC joint analysis of Emsi Burning Glass projected job openings, 2024-2029, 2021 Washington ESD long-term employment forecast; Bureau of Labor Statistics Training levels; IPEDS; 2019 Census PUMS data.

Graduate and Professional Level. Many areas of the state face difficulties in filling job vacancies for skilled workers at the graduate and professional level. In addition to a need for physicians, which is particularly acute in rural areas of the state, registered nurses with graduate degrees and nurse practitioners are in demand at the graduate level. Nurse practitioners are qualified to diagnose medical problems, order treatments, perform advanced procedures, prescribe medications, and make referrals for a wide range of acute and chronic medical conditions within their scope of practice. They perform vital functions that fill an important need for primary medical care as healthcare demand continues to expand in Washington.

Occupations with hard to fill vacancies. Over the last several years, degree production in the health care professions has increased, largely due to a coordinated system-wide effort to invest in this field. However, substantial shortages still exist, particularly at the professional level. The Washington State Health Workforce Sentinel Network reported in 2021 that medical assistants, licensed practical nurses, and registered nurses were among the top occupations for which clinics, hospitals, and nursing facilities experienced exceptionally long vacancy times.²¹ Dental offices also reported difficulties in filling open positions for hygienists and dental assistants. Among the key reasons presented for these vacancies were difficulties finding qualified candidates in rural areas. Vacancies were particularly acute in less-populated regions where no schools with degree programs in these health fields are locally available. Rural areas also face difficulties in retaining skilled health professionals, so turnover tends to be high, exacerbating the problem.

Physician shortages. Washington’s overall physician supply, on a per capita basis, is generally comparable to national averages. But significant differences in distribution are apparent between urban and rural areas of the state. Rural areas, particularly in the eastern part of the state, are experiencing serious shortages of physicians, in both generalist and specialist fields. Compounding

this difficulty is the fact that more than half the physicians in many rural communities are currently age 55 or older, and likely to retire soon.²²

Studies have shown that the location where physicians complete their residency is the strongest predictor of where they will choose to practice.²³ For this reason, it is crucial to have enough slots for in-state residencies, particularly in underserved areas in rural parts of the state. The Elson S. Floyd College of Medicine at Washington State University in Spokane has been playing a key role in meeting this challenge, focusing on training primary care physicians to work in rural and urban underserved areas. Since admitting its inaugural class of medical students in 2017, who are now training in hospitals and clinics across Washington, it has had an impact on many of the communities that had been experiencing physician shortages. Overall, however, demand for health professionals is likely to continue to warrant careful monitoring in the foreseeable future.

Meeting Growing Demand in Key Fields

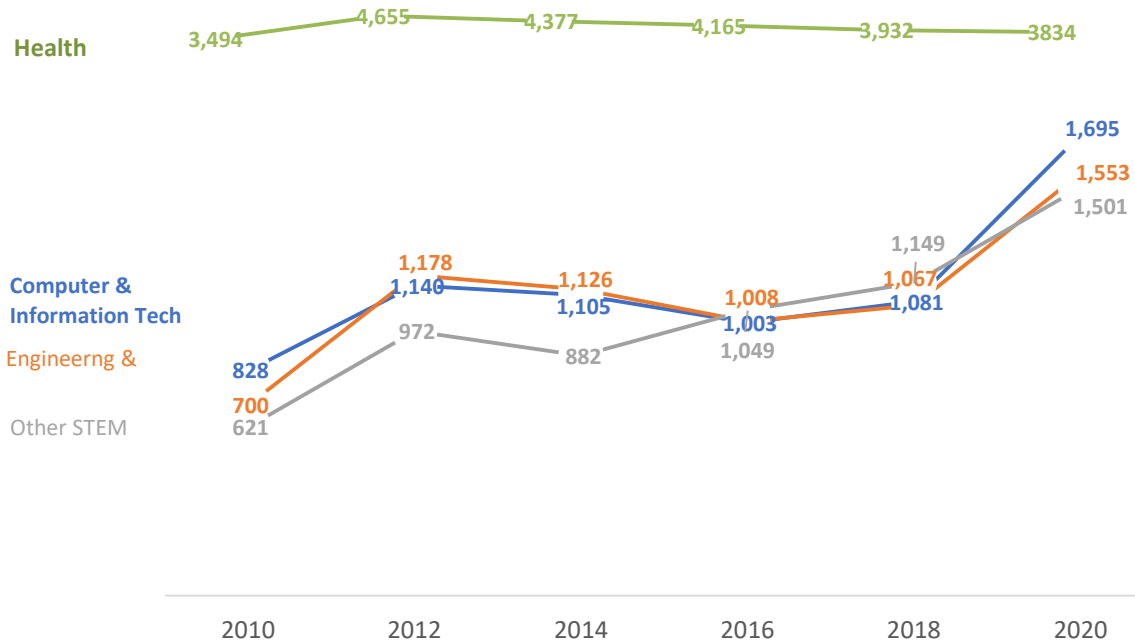
Washington is home to a range of high-quality educational institutions that have laid the groundwork for postsecondary success for many students and prepared them for the opportunities presented in the state's dynamic and innovative economy. But the challenge of rising demand in key occupational fields demonstrate that there is room for improvement at all levels. Fortunately, our institutions provide a solid foundation on which further progress can be built.

In recent years, continuous progress has been made in increasing degree and certificate production in high employer demand fields of study. Depending on the field and the educational level, progress in some areas has been more pronounced than others. But in all these key fields, degree production has generally moved in a positive direction.

Midlevel

Figure 13 shows midlevel degree and certificate production in health and a range of STEM fields from 2010 to 2020. Over this period, health completions increased steadily through the peak year of 2012, reflecting sharp enrollment increases during the recession years. Enrollments and completions declined gradually in subsequent years, as the economy rebounded, and large numbers of people were returning to work. Despite the moderate downward movement in recent years, the overall trend shows a substantial rise in midlevel degree production. The moderate decline in midlevel health completions since 2012 is due, at least in part a competitive job market, which is increasingly driving aspiring applicants to pursue a bachelor's degree over an associate degree.

**Figure 13. Associate Degree and Midlevel Certificate Completions
Washington, 2010-2020**



Source: Integrated Postsecondary Education Data System (IPEDS); apprenticeship and vocational school administrative data.

Overall, health degree completions at the midlevel have shown modest growth from 2010 to 2020. Degrees in computer and information technology, engineering and related technology, and other STEM programs have fluctuated over the years, rising and falling at times. However, degree and certificate completions have steadily increased from 2018 to 2020. After a period of declining numbers, they began to rise beginning in 2016 in response to expanding employer demand in this field. The long-term trend in STEM degree completions shows significant growth. During the four-year period from 2016 to 2020, midlevel STEM degree completions increased by 43 percent.

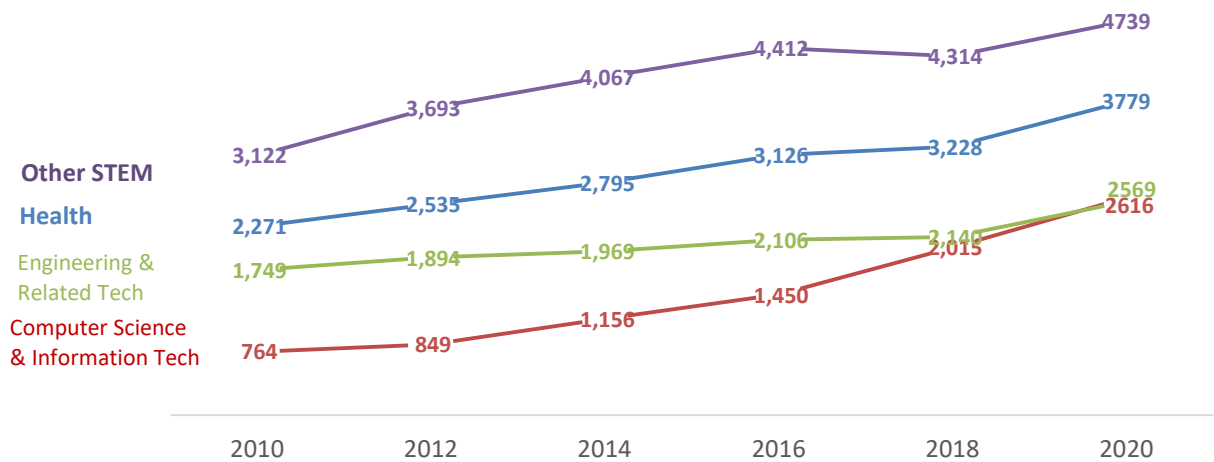
Baccalaureate Level

Figure 14 shows the trend at the baccalaureate level. Degree production in health, computer science and information science, engineering and related technology, and other science and mathematics fields increased steadily in recent years. In computer and information science, there has been consistent and substantial growth in degree-completions, increasing by over 85 percent from 2010 to 2020. Degree production also saw gains in the fields of health (over 50 percent) engineering and related technology (37 percent) and other STEM fields (nearly 55 percent) during this period.

Targeted funding for expanding STEM programs at Washington’s public universities included in recent legislative budgets was instrumental in fueling successful gains in degree production. For example, the Legislature’s 2012 budget reallocated over \$9 million in targeted funding for the state’s public universities and colleges to expand enrollments in engineering at the research universities, and to expand enrollments in science, technology, engineering, and mathematics fields at the regional institutions and the Evergreen State College.

In the 2013–15 operating appropriations, increased funding was included to expand enrollments in computer science and engineering at the University of Washington (\$4,459,000 per year), Washington State University (\$2,856,000 per year), and Western Washington University (\$1,497,000 per year). The 2015–17 operating budget provided \$6 million for computer science enrollments at the University of Washington and \$1.6 million for computer science and engineering at Washington State University. An additional \$3 million was included in the 2017-19 budget to fund expansion of computer science enrollments at the University of Washington. take on more enrollments at places like the University of Washington Seattle, With the opening of the Bill & Melinda Gates Center for Computer Science & Engineering in 2019, which doubled the total departmental space, and in effect doubling their total departmental space, allowing for significant enrollment increases. This targeted funding has been critical in driving the expansion of computer science bachelor’s degrees in the state. In just two years, from 2018 to 2020, completions have increased by almost 30 percent.

**Figure 14. Bachelor's Degree Completions
Washington, 2010-2020**

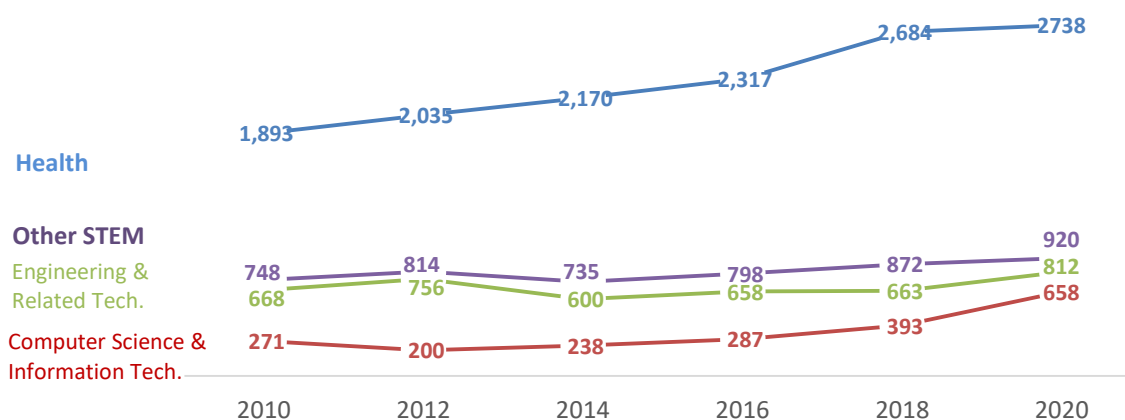


Source: Integrated Postsecondary Education Data System (IPEDS).

Graduate Level

As shown in Figure 15, at the graduate level, health sciences degree production experienced substantial growth, with an increase of over 60 percent from 2010 to 2020. Computer and information science saw even faster growth, increasing by over 75 percent during this same period. Other STEM fields as a group experienced positive but more modest levels of expansion (six percent). Degree production in engineering and related technology, however, has been relatively flat. Completions in this field rose moderately, peaking in 2012, then declined rapidly, reaching a low point in 2014. Since that time, however, completions have rose steadily.

**Figure 15. Graduate Degree and Certificate Completions
Washington, 2010-2020**



Source: Integrated Postsecondary Education Data System (IPEDS).

Overall, these completions figures show a positive trend. Postsecondary credentials are on the rise in Washington. But to meet workforce demand, we need to consider more than just completions, because not all graduates are immediately ready to enter the workforce. Some graduates opt to continue their postsecondary education, enter the military, or may postpone work for other reasons. In addition, some graduates are already employed and may be completing a certificate or degree program to upskill and advance in their field. Although they may have just completed a program, they cannot be counted as a recent graduate who is able to fill a new job opening.

Concluding Observations

Strong STEM Workforce Demand Is Seen Across All Education Levels

Washington's dynamic STEM-driven economy offers challenges as well as advantages. The state's economy is propelled largely by its growing technology and innovation sector, with leading companies in fields such as aerospace, electronic commerce, information technology, clean energy, and biomedicine. This expanding technological environment poses special challenges in aligning the state's education and career-training system with the workforce needs of its employers. It requires a focus on STEM education to effectively meet workforce demand.

Recent reports by the Washington STEM Education Innovation Alliance highlight these challenges.²⁴ Washington is among the elite states in the areas of innovation and research development, has one of the highest proportions of STEM jobs in the nation, and is one of the largest importers of technology degrees as a proportion of the population. But the state also ranks low in the production of degrees in key technology fields, such as computer science and information technology, engineering, health, and other fields associated with science and technology.

Despite overall progress during the last decade in increasing numbers of students completing degree programs, more gains are needed if we are to meet rising employer demand in a range of key fields. Significant employer workforce needs are seen at all education levels: middle skills, baccalaureate, and graduate. Among the areas facing the greatest workforce pressures are the STEM fields, particularly in computer science and information technology, engineering, and health. Education is also facing recruitment and retention challenges in high-need fields—in areas like science, math, and special education—and in hard-to-staff schools and districts.

Current data show gains in increased degree production in high demand fields at the middle skills, baccalaureate, and graduate and professional levels. However, workforce pressures are still surging, particularly in the STEM occupations. More expansion will be required to meet the needs of our state's dynamic economy and to provide more Washington residents with vital opportunities to compete for high-skill, high-wage jobs.

The current post-covid economic recovery in Washington appears to be steady, which bodes well for the labor market and employment opportunities for jobseekers. But there are still reasons to be cautious. The state unemployment rate has declined considerably since the peak-pandemic period in mid-2020 and was at 3.9% in May 2022. But this is still higher than the national rate. As of May 2022, Washington has fully recovered or is on track to fully recover all jobs lost during the pandemic. However, the state economy is still showing some volatility. On a seasonally adjusted basis, preliminary estimates from the federal Bureau of Labor Statistics (BLS) indicate nonfarm employment in Washington fell by 2,300 in May 2022.

Further studies are needed

Additional investigations could illuminate how equity gaps in higher education and the labor market are affecting our ability to meet workforce demand in Washington. It is beyond the scope of this current study. But additional analyses are needed to disaggregate the data by race, ethnicity, and gender to give a more complete picture of how education attainment levels are related to jobs in the various industries, wages, and unemployment trends. Examining the relationships between education attainment, workforce demand, wages, and unemployment through an equity lens could provide a deeper perspective on Washington's complex labor market. Closing education and workforce equity gaps should play a key role in our efforts to prepare the state's residents to meet employer workforce demand and seize promising employment opportunities in our state's innovative economy.

Appendix: Notes on the Analysis

The conclusions contained in this report were based on two primary measures: 1) workforce supply, estimates of the annual number of graduates entering the workforce by degree level and major field of study, and 2) employer demand, projections of the number of net annual job openings by sector and education level.

Workforce Supply

The analysis of workforce supply was grounded in degree production data from the Integrated Postsecondary Education Data System (IPEDS), which was adjusted to estimate the number of graduates expected to immediately enter the workforce. IPEDS compiles results from annual institutional surveys conducted by the National Center for Education Statistics. These surveys include data on enrollments and degree-completions from every college, university, and technical and vocational institution that participates in federal student financial aid programs. Since not all graduates immediately enter the workforce, these completion figures must be adjusted to account for graduates who opt to continue their postsecondary education or postpone work for other reasons. These modified figures are necessary to arrive at realistic estimates of the number of graduates available to meet employer demand.

For the midlevel, IPEDS data was supplemented with administrative data from the Workforce Training and Education Coordinating Board. The Workforce Board's data captures degrees and certificates awarded by schools operating in Washington but not reporting credentials in IPEDS for Washington, either because they do not participate in Title IV aid programs or because they are based out of state and report completions in their home state.

Workforce supply was adjusted using data from the 2015–2019 American Community Survey conducted by the U.S. Census Bureau, which includes the percentages of degree holders in this survey reporting that they were 1) enrolled and either unemployed or employed part-time, 2) enlisted in the military, or 3) not in the labor force. The data were used to estimate the percentage of degree-completers that would not immediately be available to enter the workforce. For each degree level, the total number of completions was adjusted downward by the corresponding aggregate percentage.

Employer Demand

Employer demand was estimated using projected job openings from Emsi Burning Glass for the period of 2024 – 2029. In past reports we have tended to use the Washington State Employment Security Department (ESD) long-term occupational forecast to analyze demand. But for this report, by using Emsi Burning Glass projections, it allows us the flexibility to apply their numbers to a range of other purposes.

Emsi Burning Glass calculates job openings in two ways:

- **As the result of growth.** Emsi Burning Glass counts a growth opening whenever a new job is created in an occupation. For example, when a hospital with 12 Registered Nurses on staff decides to hire a 13th RN to keep up with growing workload.
- **As the result of a replacement need.** Emsi Burning Glass counts a replacement need opening when a worker leaves an occupation (defined as a Standard Occupational Classification (SOC) code). For example, take the case of an RN retiring, or an Accountant switching careers and

taking a job as an Economist. In both cases, an opening is created that must eventually be filled by bringing a new worker into the occupation.

Openings due to growth are calculated from Emsi Burning Glass's job counts data. Openings due to replacements are calculated by applying the Bureau of Labor Statistics separation rate to the job counts data, resulting in an estimated number of occupations that will need replacement workers.

The BLS has recently revised their methodology after concluding that they had been significantly undercounting occupational openings. The revised methodology is designed to more accurately estimate the number of workers who leave a particular occupation and need to be replaced by new entrants into the occupation. The intention of the new method is to capture more of the shifting worker movement within and between occupations. For some occupational groups, this new approach shows substantially larger projections than we have seen in previous reports, with the number of projected annual openings as much as two to three times larger than shown in previous reports.

The primary difference between the old method and the new method lies in how worker replacements are accounted for. In the old method (what BLS calls the "replacement methodology"), workers who have left occupations and have been replaced by workers from different age cohorts are considered to have permanently left the occupation and are identified as generating replacement openings. On the other hand, those replaced by workers from the same age cohort are not identified as generating replacement openings. For this reason, economists at the BLS were concerned that the inability to track openings generated by replacement workers of the same age cohort was causing a significant undercount of openings. The new methodology (the "separations methodology") is more straightforward. Any workers who exit the labor force or transfer to an occupation with a different Standard Occupational Classification (SOC) are identified as generating separations openings. For more information on the BLS approach to calculating separations rates, see their discussion on Occupational Separations Methodology.²⁵

As a final step in determining the supply figures, the long-term employment projections obtained from ESD are matched against estimates of the training and education levels required for various occupational types, based on Washington Student Achievement Council staff analysis of U.S. Census Bureau data. In this way, the minimum training levels for occupations determined by the Bureau of Labor Statistics are adjusted to reflect the actual education and training levels of current incumbent workers.

Limitations of the Analysis

A few limitations of this analysis that could affect the data reported at each level should be noted. First, the report is not able to fully address the impact of new and emerging industries and occupations, due to restrictions in the methods of the job openings projections. Emsi Burning Glass relies on historical trends for these projections. Consequently, in some fields the projection numbers do not fully capture evolving demand for workers with specific skills and training.

In addition, annual completions numbers may overstate the supply of graduates prepared to fill open positions in fields where a significant number of workers would complete a degree or certificate as a normal part of their ongoing professional development. The education field is a good example. Some teachers receive their initial training at the master's level and upon completing their degree are available to fill an opening in that occupation. But many practicing teachers pursue master's degrees as part of their professional development and upon completion do not change

their job or occupation and therefore are unavailable to fill openings. We see similar issues in health care, particularly among practicing nurses who often train at the associate level but then later complete a bachelor's degree, and managers who may complete a Master of Business Administration as part of their professional development.

Finally, the analysis is not intended to fully account for the overall dynamics of the current economy and employment market for recent graduates. Currently, the ongoing COVID-19 pandemic has dramatically changed the labor market in Washington. Projections of job openings based on historical trends are limited in the ability to forecast employer demand going forward in this evolving workforce environment.

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