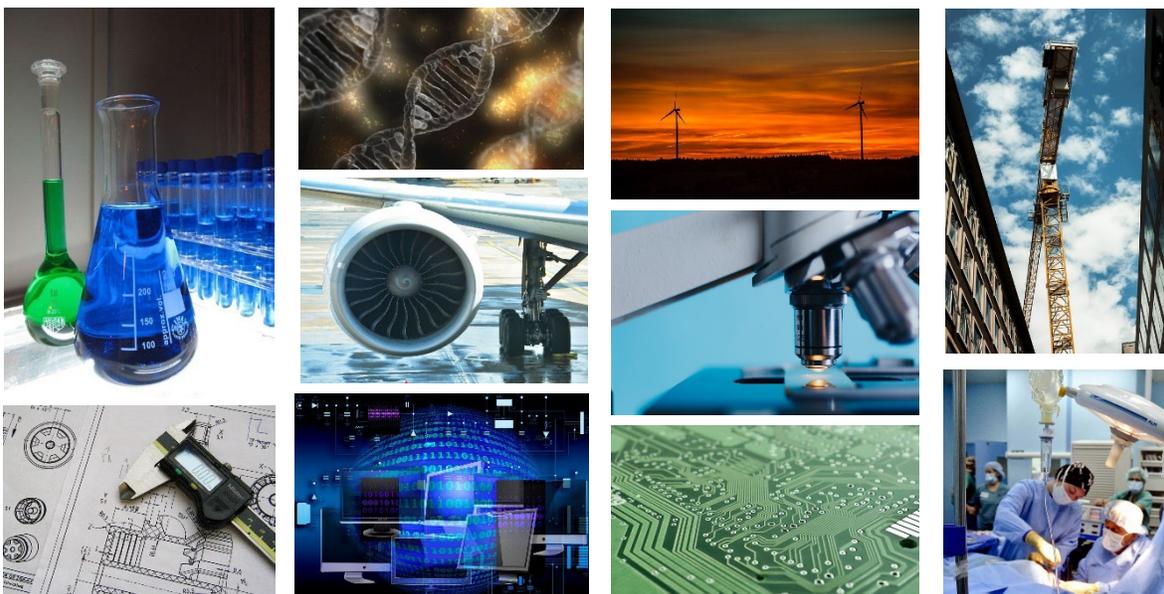

Washington's Skilled and Educated Workforce 2019-20



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

A Joint Agency Report

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Executive Summary

Workforce Demand for Skilled Workers with Postsecondary Education Remains Strong

Consistent with a long-term trend highlighted in previous reports, Washington employment projections continue to show strong demand for workers with postsecondary education. Nearly 70 percent of all projected job openings require at least some education beyond high school, with two-thirds requiring midlevel education or higher. As businesses, industries, and workplaces become increasingly complex, employers need workers with skills and education that allow them to adapt and excel in evolving environments.

A new methodology employed for the 2019 analysis has resulted in an overall increase in the numbers of projected job openings compared to previous years. The Bureau of Labor Statistics has recently revised the way they estimate the number of workers who leave a given occupation and need to be replaced by new entrants into the occupation. The intention of the new method is to provide a more realistic and complete picture of current and future occupational demand (see Appendix A for more detail).

At the middle skills level* the greatest workforce needs are in production and trades; business, management, and sales; human and protective service; health professions; and computer and information science. Demand in production in trades is led by jobs for skilled construction workers, millwrights, bus and truck mechanics, and diesel engine specialists. In line with previous analyses, demand also remains strong for specific health occupations, led by jobs for licensed practical and registered nurses; nursing, psychiatric, and home health aides; medical and dental assistants; diagnostic-related technologists; and dental hygienists. The main drivers of midlevel demand in computer and information science are jobs for computer support specialists, database and network administrators, systems analysts, and web developers.

At the baccalaureate level overall degree-completions in computer science, engineering, health, and other STEM fields have increased substantially from 2008 to 2018. 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, and systems analysts. 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, particularly in the area of civil engineering. The prominence of these two fields 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: preschool and 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 is led by projected openings for physicians, surgeons, physical therapists, dentists, and pharmacists, and for advanced practice registered nurses, physical and occupational therapists, and medical technicians.

* The midlevel 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.

A Note on the Economic Impact of the COVID-19 Pandemic

Most of the data used in this report was collected before the onset of the COVID-19 pandemic of 2020 and therefore does not account for the short-term and long-term impacts on the state's economy. The pandemic has had a deep effect on Washington's economy. As of May 2020, the unemployment rate is above 15 percent statewide, and in some counties is close to 20 percent. The shock to Washington's economy unfolded very rapidly, but the long-term impacts on employers and jobs may result in a recovery that could take months or years.

Throughout the report, sidebars have been added to highlight examples of the impact the pandemic is currently having on workforce demand. In the transitional period, as the state's various industries and business sectors begin a phased reopening, the employment environment is likely to remain in flux. But, as the economy returns to normal in the post-recovery period, it is our hope that the long-term employment projections and workforce-demand analysis contained in this report will capture the salient trends.

Further Studies Are Needed to Analyze Equity Gaps in the Labor Market

Further 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 needs as we work through the COVID-19 pandemic crisis and beyond.

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Background

Purpose of the Report

This report has three primary purposes: (1) to provide an overview of the current status of workforce preparation in Washington, (2) to identify high employer demand occupations, as well as fields in which academic degree production may be failing to keep pace with demand, 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 2022 to 2027.

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 Context

National Education and Workforce Trends

Low-Income Students Face Increasing Challenges to Balance Work and Postsecondary Education¹

It is becoming increasingly more difficult for students to work their way through college. This is especially true for low-income students, who face steeper challenges when combining work and learning compared to those who are more affluent. Students from higher-income families, relying on social capital and connections, are more likely to benefit from, rather than be challenged by, working while they learn. They tend to work fewer hours in jobs directly related to their fields of study. Low-income working college students often work longer hours, often at jobs unrelated to their fields of study, and as a result, are less likely than their higher-income peers to excel academically and complete degrees.

Key Findings:

- Of the 14 million working learners, about 6 million (43%) are low-income students.

- Low-income working students are disproportionately Black (18%) and Latino (25%), women (58%), and first-generation college students (47%), while higher-income working students tend to be White (73%).
- Low-income working learners are more likely to enroll in certificate programs and attend either two-year public or for-profit colleges than higher-income working learners, whereas higher-income working students are more likely to enroll in bachelor's degree programs and attend selective four-year colleges and universities.
- Low-income working learners are less likely to earn a credential overall, even if they come from the upper end of the academic performance distribution.

Low-income working college students often work longer hours than their higher-income peers, and often at jobs unrelated to their fields of study.

- Georgetown Center on Education and the Workforce

Racial and Ethnic Disparities in Educational Attainment Persist

A recent study by the Georgetown Center on Education and the Workforce has shown that, over the last few decades, college-going rates among African American and Latino students have nearly doubled, but this has not led to commensurate gains in college completion.² As a result, the Black and Latino share of public college enrollment has grown from 15 percent in 1980 to 35 percent in 2015.

However, those impressive college-going gains are not being matched by gains in college completion. Going to college isn't enough. Getting a credential with labor market value is. Today, even with their elevated college-going rates, Black and Latino students are only about half as likely as Whites to attain a bachelor's degree or higher. In fact, over the past 35 years, as Black and Latino college-going rates have climbed, the deficit in bachelor's degree attainment for Blacks and Latinos compared with Whites has increased from 15 percentage points to 21 percentage points.

Despite substantial progress in college-going rates, African-American and Latino students are still only about half as likely to attain a bachelor's degree or higher than White students.

- Georgetown Center on Education and the Workforce

A reason for the widening deficit: while White students inordinately attend selective four-year public colleges to pursue bachelor's degrees, Black and Latino students in disproportionate numbers go to open-access public colleges, most of them community colleges where the highest possible credential is an associate degree.

Certificate and Associate Degree Programs Disproportionately Enroll Racial and Ethnic Minorities³
Nationally, among students taking undergraduate courses, a full 50 percent are enrolled in midlevel programs (certificate and associate degrees), 47 percent are enrolled in bachelor's

African-American and Latinx students are more likely to enroll in certificate or associate degree programs than White students.

- Georgetown Center on Education and the Workforce

programs, and 3 percent are taking postsecondary coursework but are not enrolled in a program. But the distribution is not equal across racial and ethnic groups. Among White students, 53 percent are enrolled in programs at the bachelor's level and 47 percent are enrolled at the midlevel. Among Latinx students, only 38 percent are enrolled in bachelor's programs, compared to 62 percent enrolled in midlevel programs. Among African-American students, the distribution among bachelor's and midlevel programs is 44 percent and 56 percent, respectively. For many students from

underrepresented groups, the midlevel programs they begin with too frequently become their highest level of educational attainment. Without a change in these enrollment trends, closing equity gaps by race, ethnicity, or income will continue to be a difficult challenge.

Nationally, About One-Third of Workers Embark on Their Careers Through the Middle Skills Pathway⁴

Around 8 percent of workers have a postsecondary certificate as their highest level of educational attainment, and 9 percent have an associate degree. An additional 15 percent of workers have completed some college but do not have a credential. Researchers at the Georgetown Center contend that earning a bachelor's degree is not a necessary steppingstone to a good-paying job. Their research shows that middle skills credentials are often undervalued. Depending on field of study, certificate and associate degrees can lead to strong careers with competitive pay.

Women with Baccalaureate or Graduate Degrees Outnumbered Men in the Labor Force for the First Time in 2019

A recent report by the Pew Research Center estimates that 2019 marks the first year that women outnumber men among workers with at least a bachelor's degree.^{5,6} The report, based on an analysis of data from the U.S. Bureau of Labor Statistics, notes that in the first quarter of the year, 29.5 million women with a bachelor's degree or higher were in the labor force, compared to 29.3 million men with the same educational level. With this milestone, women now comprise 50.2 percent of this key part of the national labor force.

2019 will mark the first year that women will be a majority in the U.S. college-educated labor force.

- PEW Research Center

What makes this significant is not the number of women with postsecondary degrees but the number in the workforce. Women surpassing men in postsecondary education is not new. Women

have consistently received a majority of postsecondary degrees awarded at both the two-year and the four-year levels for years. Women currently receive about 57 percent of all bachelor’s degrees each year, and women have outnumbered men among the population with at least a bachelor’s degree for more than a decade. But, historically, women at the baccalaureate level have been less likely than their male counterparts to enter the workforce, comprising only 45.1 percent of the workforce in 2000. The gender gap has gradually narrowed in recent years, with women reaching parity and beyond in 2019.

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



Source: 2013-17 American Community Survey. Wages include civilian employed Washington residents ages 25-44. Unemployed rate reflects civilian labor force for Washington residents age 25-44.

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.

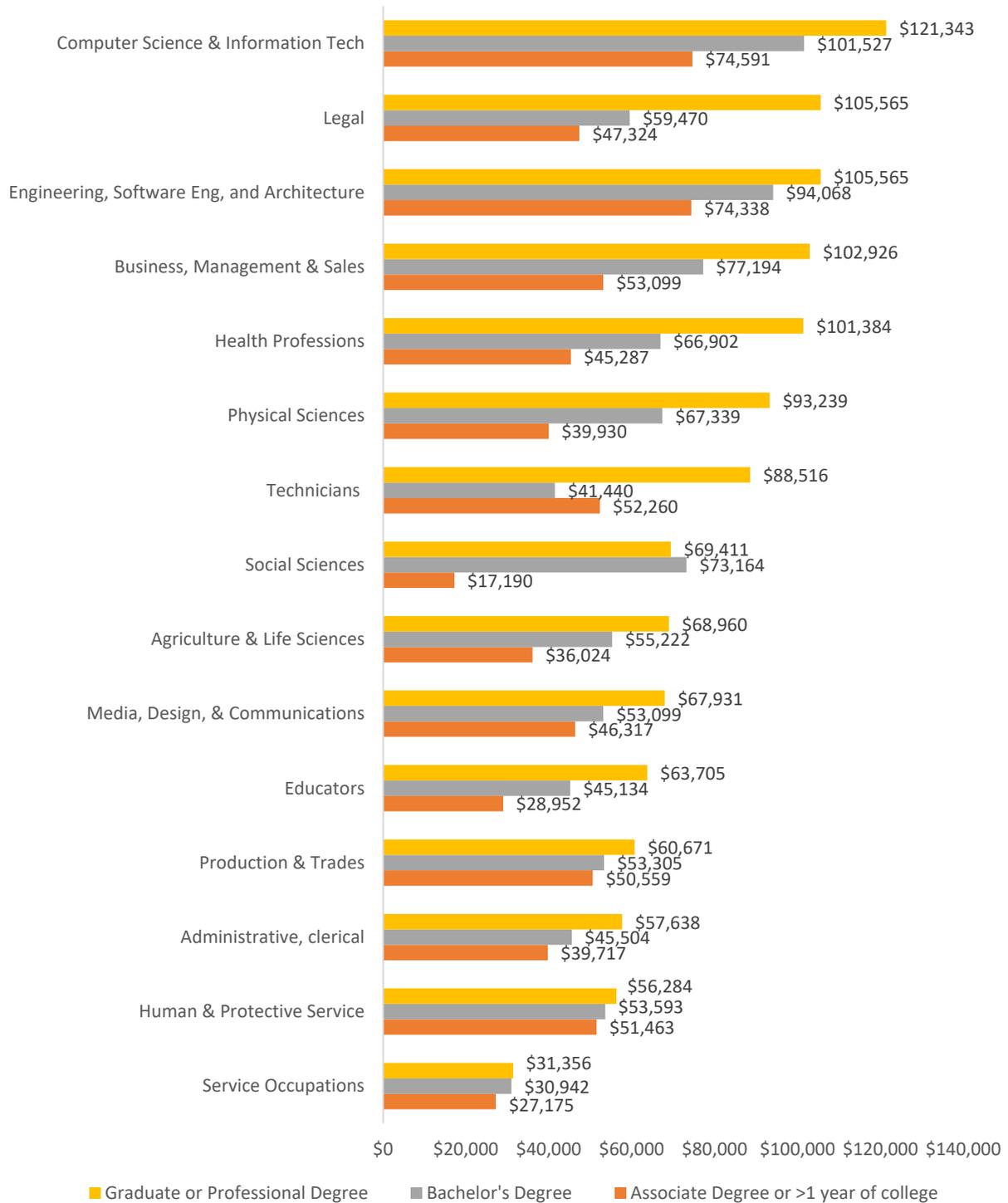
Education Levels and Occupations are Major Determinants of Wages

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 \$74,000 for workers at the midlevel (associate degree or a year or more of college) to \$101,000 for those with a bachelor's degree and \$121,000 with a graduate degree. A similar pattern of progressive wage increase with higher levels of education is seen in all occupations.

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, such as in the administrative, clerical, and service occupations. But it is also seen in some professions with more defined skill sets, as seen in production and trades and in human and protective services.

Figure 2

Washington Median Wage by Education Level 2013-2017



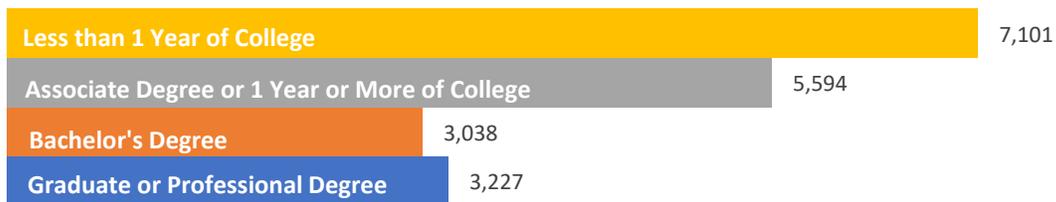
Source: WSAC Staff Analysis of 2013-2017 American Community Survey Data.

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

Although the COVID-19 pandemic has created a temporary economic downturn with an uncertain future in 2020, Washington has been a state with 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 2013 and 2017, 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 6,000 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 2013-2017



Source: WSAC Staff Analysis of 2013-2017 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. Among all states, Washington ranks fourth in overall net in-migration and third for in-migration of workers with bachelor's degrees and above.⁷ This statistic highlights the challenge that a number of 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 Strong Demand for Workers With Postsecondary Education in Washington

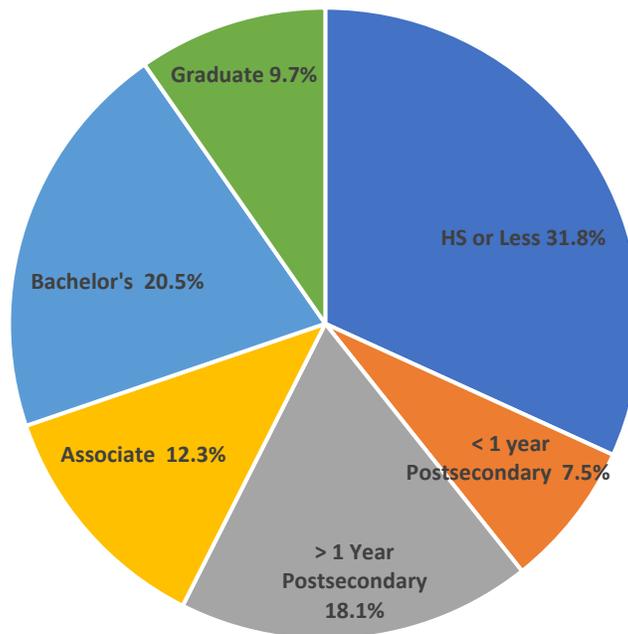
The trend toward increasing complexity in the workplace and the need for more skilled and educated workers, as observed in recent national studies, are clearly reflected in Washington's employment outlook. As shown in Figure 4, a clear majority of all job openings (nearly 70 percent) will require at least some education beyond high school, with over 60 percent requiring at least a year or more of postsecondary training. Almost 38 percent of open positions will call for workers educated broadly 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, more than 30 percent of employment opportunities will be aimed at workers who have bachelor's degrees or above, with about 21 percent of openings requiring a baccalaureate and 10 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 (about 32 percent) has increased in recent years, from 23 percent in 2015 and 27 percent in 2017. This is not surprising, since Washington experienced historically low unemployment rates throughout 2019. Under these conditions, a certain amount of expansion in lower-skill jobs is normal and should be expected.

Figure 4

Total Projected Job Openings by Education Level 2022-2027



Source: WSAC Analysis of openings in 2019 Washington State Employment Security Department, Long-Term Employment

Workforce Demand is Strong at all Education Levels

In Washington's economy, demand remains strong for workers trained at all postsecondary levels, middle-skills, baccalaureate, and graduate/professional.

The demand outlook looks greater this year due to a new Bureau of Labor Statistics methodology for projecting job openings.

In this analysis, the demand figures are based on long-term projections of job openings calculated each year by the Washington Employment Security Department (ESD). For these projections, ESD relies upon a methodology established by the Bureau of Labor Statistics (BLS). The BLS, after concluding that they had been significantly undercounting occupational openings, has recently revised their methodology to more accurately estimate the number of workers who leave a given occupation and need to be replaced by new entrants into the occupation. The intention of the new method is to afford a more realistic and complete picture of future occupational demand. For some occupational groups, this new approach shows substantially projected annual openings that are as much as two to three times larger than shown in previous reports. See Appendix A for more detail on the analytical methodology.

At each of the three education levels certain occupational clusters stand out with respect to employer needs.

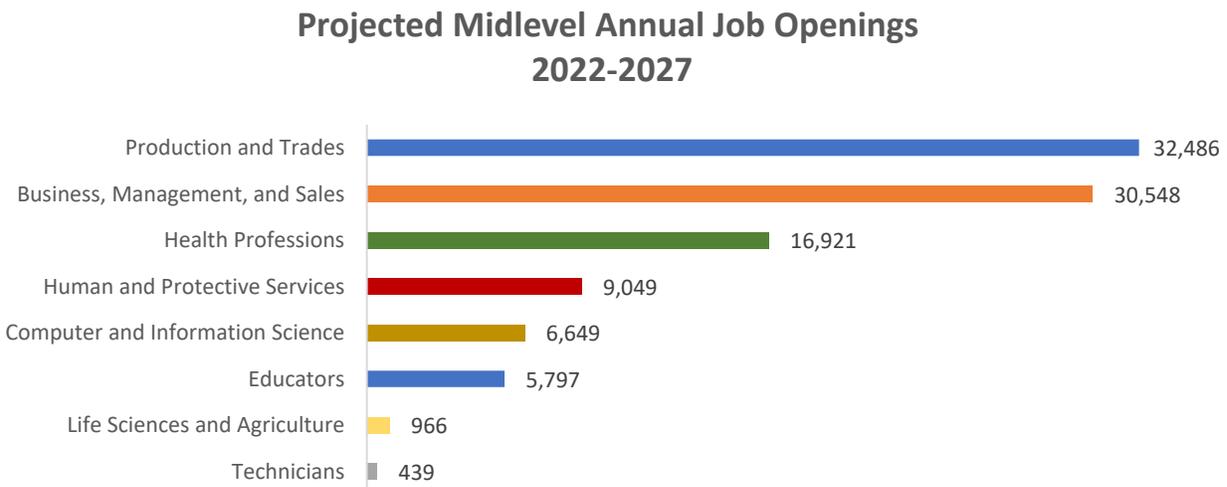
The Middle Skills Level

Midlevel jobs include those for workers who have completed two-year degrees, long-term certificate programs of one year or more, or apprenticeships.

Key Drivers of Demand

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; business, management, and sales; human and protective services; health professions; and computer and information science.

Figure 5



Source: WSAC, WTECB, SBCTC joint analysis of 2019 Washington ESD long-term employment forecast; Bureau of Labor Statistics Training levels; IPEDS; 2018 Census PUMS data.

Midlevel employer demand in these fields is led by jobs in the following occupations:

Production and Trades. This includes occupations in a wide range of fields, including construction, manufacturing, mechanics, equipment operation maintenance and repair. Demand in this cluster is led by jobs for skilled construction workers, first-line supervisors in construction, millwrights (skilled tradespersons who install and maintain machinery in factories, power plants, and construction sites), brick and stone masons, packaging and filling machine operators, bus and truck mechanics, and diesel engine specialists.

Business, Management, and Sales. Demand in this field at the midlevel is led by job openings for general and operations managers; compensation, benefits, and job analysis specialists; marketing and sales managers.

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 database administrators, network and computer systems administrators, web developers, computer systems analysts, and information security analysts.

Life Sciences and Agriculture. The majority of 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 15.

Health. Another key occupational area with workforce needs at the middle skills level is in healthcare. See page 18 for a closer look at demand in the health field at the three different education levels.

COVID-19 IMPACT

Production and Trades Midlevel Job Postings Jan. to May 2020



From Jan. – April 2020, job postings for production and trades occupations declined precipitously by 39%. Since that low point, postings have begun to rise, increasing by 14% from April to May. This may be an indication that this sector is in the early stages of a recovery.

Source: Labor Insight (Burning Glass Technologies)

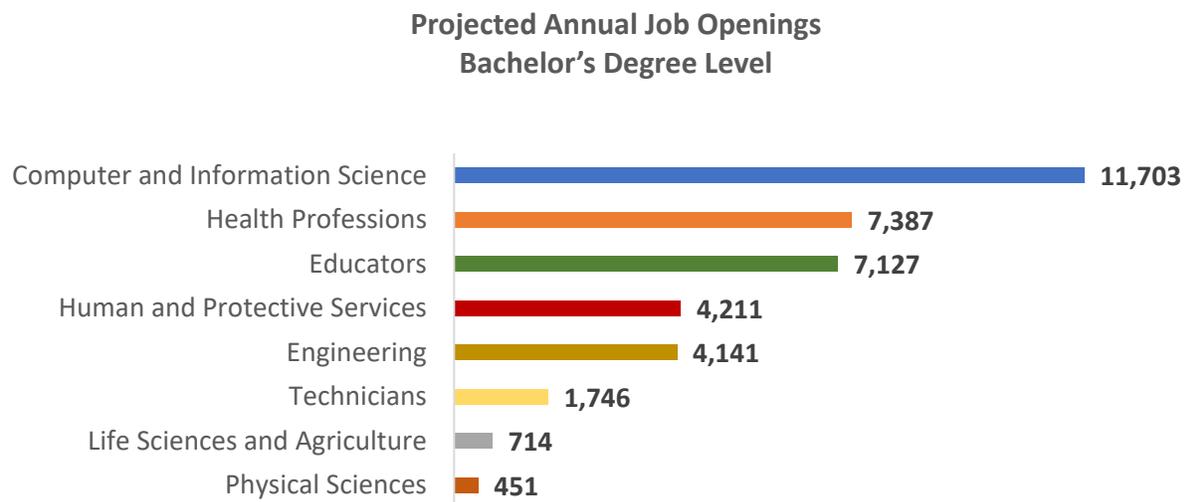
The Baccalaureate Level

Figure 6 shows the occupational clusters with the greatest demand for skilled workers at the bachelor's degree level. Many of the same fields that have been highlighted in previous reports also appear this year.

Key Drivers of Demand

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



Source: WSAC, WTECB, SBCTC joint analysis of 2019 Washington ESD long-term employment forecast for 2022-2027; Bureau of Labor Statistics Training levels; IPEDS; 2018 Census PUMS data.

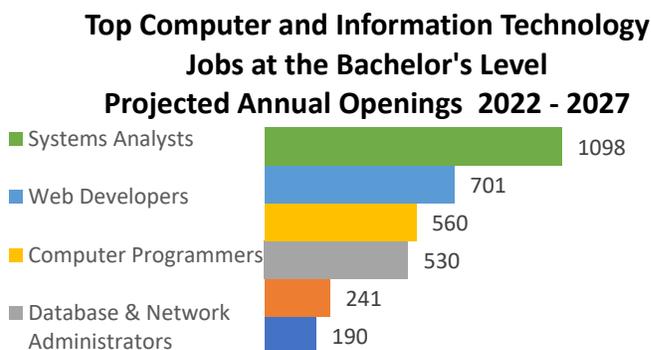
Computer and Information Science.

Employment opportunities for workers with computer science skills at the baccalaureate level is strong across the field. However, the need for skilled workers in this area is particularly prominent in certain occupations. As shown in Figure 7, nearly a quarter of all projected job openings are for computer systems analysts. Other occupations that are driving demand are web developers (15 percent),



programmers (12 percent), database and network administrators (11 percent), network architects (5 percent), and information security analysts (4 percent). 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

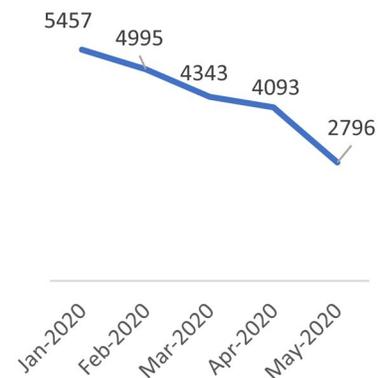


Source: WSAC, WTECB, SBCTC joint analysis of 2019 Washington ESD long-term employment forecast; Bureau of Labor Statistics Training levels; IPEDS; 2018 Census PUMS data.

Health Professions. Another area in which Washington is experiencing workforce shortages at the bachelor's level is in the health professions. See page 18 for a discussion of demand in the health field at the different education levels.

COVID-19 IMPACT

Information Technology Bachelor's Level Job Postings January - May 2020

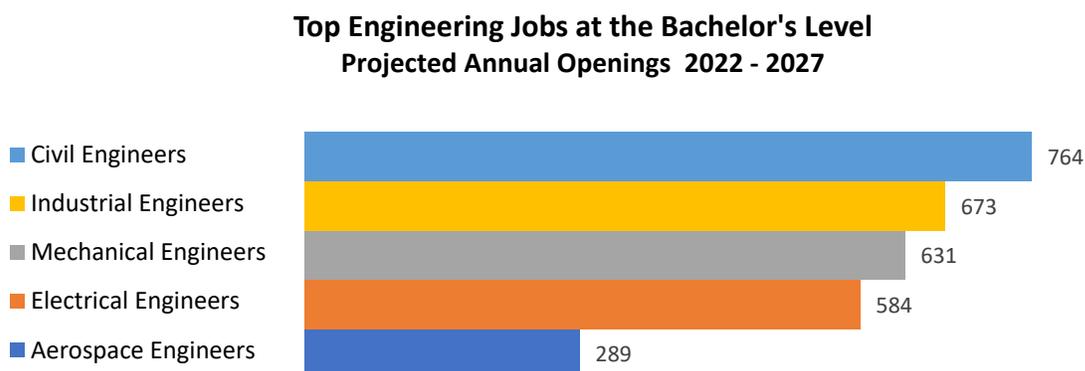


From January to May 2020, job postings in information technology occupations for workers with a bachelor's degree declined by nearly 49 percent. Even though many information technology jobs are compatible with remote work, job openings in this field also showed a steep decline, reflecting the strength of the coronavirus impact.

Source: Labor Insight (Burning Glass Technologies)

Engineering. Demand for engineers is also strong across all areas of specialization. But several fields stand out (see Figure 8). Eighteen percent of projected openings are for civil engineers, a strong indication of the continuing surge in construction the state is currently undergoing, as part of the upswing that began during the economic recovery. Rounding out the list of occupations with the highest employer demand at the baccalaureate level are industrial engineers (16 percent), mechanical engineers (15 percent), electrical engineers (11 percent), and aerospace engineers (7 percent). In 2020, demand in these fields has diminished, at least temporarily, with the impact of the pandemic on construction and manufacturing. The aerospace industry has been particularly deeply affected, with the Boeing Corporation—already reeling from a production hold on the 737 Max commercial airline—announcing in May that they would be cutting jobs by 10 percent.

Figure 8



Source: WSAC, WTECB, SBCTC joint analysis of 2019 Washington ESD long-term employment forecast; Bureau of Labor Statistics Training levels; IPEDS; 2018 Census PUMS data.

Education. At the bachelor’s level, demand is strongest for elementary and middle school teachers, with nearly 25 percent of openings for educators at the bachelor’s level. For more information on the educator shortage in Washington, see further discussion beginning on page 15.

Human and Protective Services. Another occupational cluster with significant employer workforce needs is human and protective services. Demand at the bachelor’s level is primarily driven by jobs in a few key fields. In the top group, 27 percent of forecasted job openings are for counselors and 24 percent for social workers. Employment growth in this field is led by jobs in 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.

Technicians. Demand in this field is led by job openings for life, physical, and social science technicians, representing 67 percent of the total, and biological technicians at 27 percent.

Life Sciences and Agriculture. The majority of projected openings in life sciences and agriculture are for biologists, conservation scientists, and foresters.

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.

The Graduate and Professional Level

Key Drivers of Demand

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; media, design, and communications; engineering; physical sciences; life sciences; and agriculture.

Figure 9



Source: WSAC, WTECB, SBCTC joint analysis of 2019 Washington ESD long-term employment forecast; Bureau of Labor Statistics Training levels; IPEDS; 2018 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 6,000 openings projected per year through 2027. But currently, fewer than 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 higher demand. Employment opportunities for computer programmers and computer systems analysts round out the top group. The higher 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 15 for further discussion of workforce demand in education.

Media, Design, and Communications. Demand in the area of 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.

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.

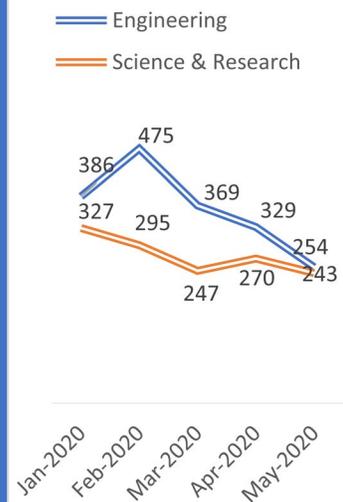
A Closer Look at Demand in Two Key Fields

Education

In 2019, 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.⁸

COVID-19 IMPACT

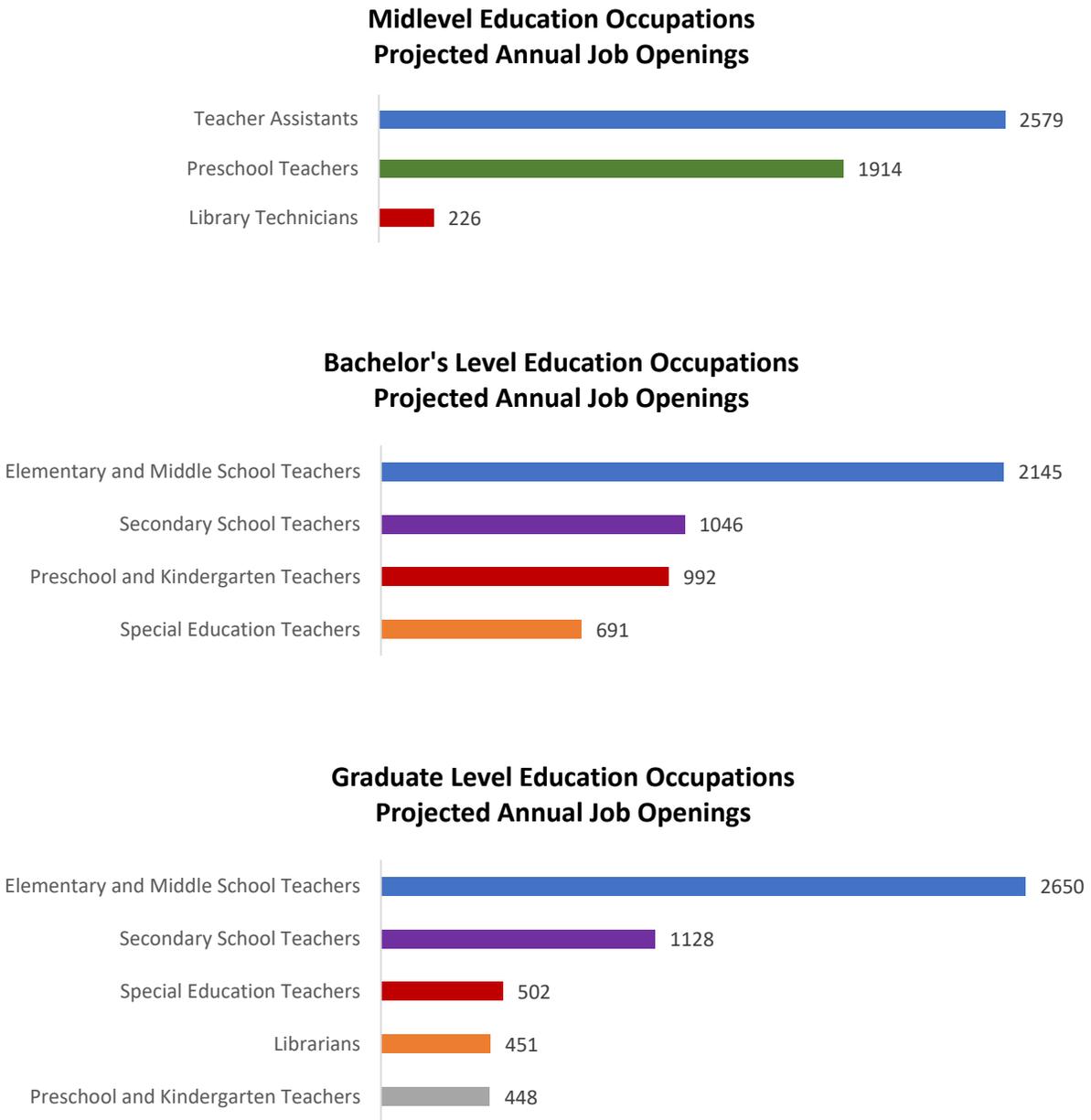
Graduate Level Job Postings Jan. to May 2020



The COVID-19 pandemic is also having a substantial impact on occupations at the graduate level. From a peak in February to May 2020, job postings for engineering positions declined by 46 percent. During this same time period, job postings in science and research occupations fell by nearly 26 percent.

Source: Labor Insight (Burning Glass Technologies)

Figure 10



Source: WSAC, WTECB, SBCTC joint analysis of 2019 Washington ESD long-term employment forecast; Bureau of Labor Statistics Training levels; IPEDS; 2018 Census PUMS data.

Several factors are contributing to increased demand for qualified educators, which is currently outpacing teacher preparation in the state. One factor is the ongoing challenge of reducing class sizes in response to the Washington State Supreme Court's McCleary decision on public education funding and reform. This decision directed the state to address the implementation plan for K–3 class-size reduction and full-day Kindergarten outlined in Substitute House Bill (SHB) 2776. As a result of this decision and related legislation, demand for more elementary school teachers has sharply increased. Moreover, the decision fostered political pressures for further measures to reduce class sizes for all grades.

Compounding the pressure for more teachers caused by class-size reduction is the difficulty of retaining qualified teachers in some areas of the state. A study on teacher retention, conducted by the Center for the Study of Teaching and Policy at the University of Washington, concluded that Washington in general is not facing a large wave of teachers leaving the state or the profession.⁹ But rural areas and some urban districts face challenges in keeping qualified teachers. Adding to this challenge is a downward trend in teacher program enrollment and completions in the state.



According to a 2019 Professional Educator Standards Board study, some of the main drivers of the state's educator shortage are teacher attrition and difficulties in recruiting and retaining teachers in critical content areas, such as math, science, and special education.¹⁰ This report suggests that up to 90 percent of the educator shortage may be due to problems with teacher retention. And the parts of the state that are facing the most pressing challenges are in rural areas and in urban and economically disadvantaged districts. To address the teacher shortage, PESB has recommended a multi-pronged approach. Several strategies could be pursued, including exploring ways to make the teaching profession more attractive, increasing the pipeline through recruitment efforts and scholarships, expanding alternative route programs for teacher certification, and broadening interstate teacher certification reciprocity agreements.

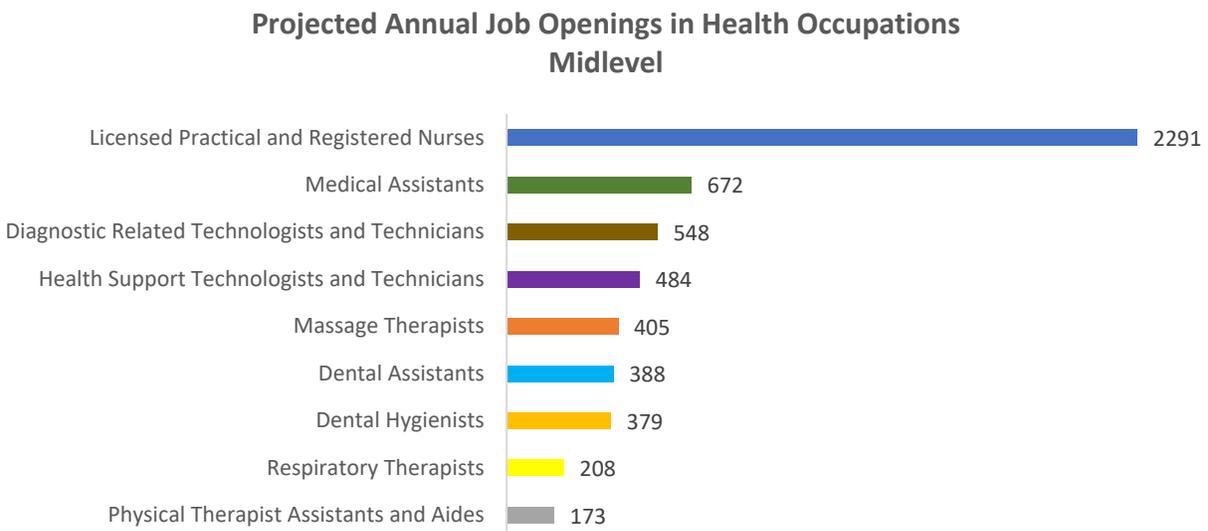
Health

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 the 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

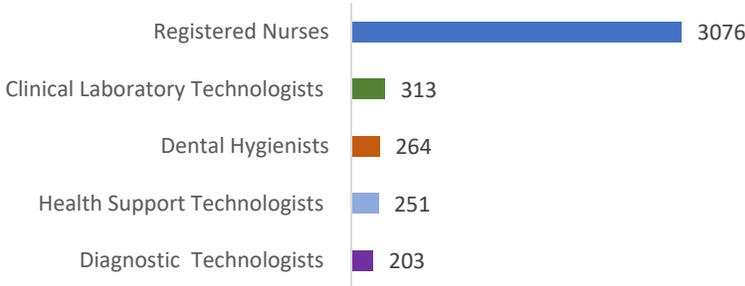


Source: WSAC, WTECB, SBCTC joint analysis of 2019 Washington ESD long-term employment forecast; Bureau of Labor Statistics Training levels; IPEDS; 2018 Census PUMS data.

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

Figure 12

**Projected Annual Job Openings in Health Occupations
Bachelor's Degree Level**



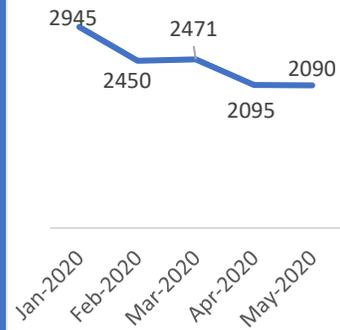
Source: WSAC, WTECB, SBCTC joint analysis of 2019 Washington ESD long-term employment forecast; Bureau of Labor Statistics Training levels; IPEDS; 2018 Census PUMS data.

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 2019 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.¹¹ 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.

COVID-19 IMPACT

**Registered Nurse Job Postings
Jan. to May 2020**



In response to the COVID-19 pandemic, health care jobs contracted across the state, as many operating rooms and doctor's offices were closed, and elective surgeries, diagnostic procedures, and appointments were cancelled. For example, the University of Washington Medical Center in Seattle furloughed 15 percent of its staff during the month of May. From January to May 2020, job postings for registered nurses declined by 29 percent.

Source: Labor Insight (Burning Glass Technologies)

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.¹²

Studies have shown that the location where physicians complete their residency is the strongest predictor of where they will choose to practice.¹³ 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 new Washington State University Medical School in Spokane will play a large role in meeting this challenge. One of its primary missions is to focus on training primary care physicians to work in rural and urban underserved areas. Its inaugural class of medical students are now in their third year and are beginning training in hospitals and clinics across Washington. In a few more years, the impact of this expansion will be felt in the communities currently experiencing physician shortages. Overall, however, demand for health professionals is likely to continue to warrant careful monitoring in the foreseeable future.

Meeting the Demand

Washington is home to a range of high-quality educational institutions that have laid the groundwork for postgraduate success for many students and prepared them for the opportunities and challenges of 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.

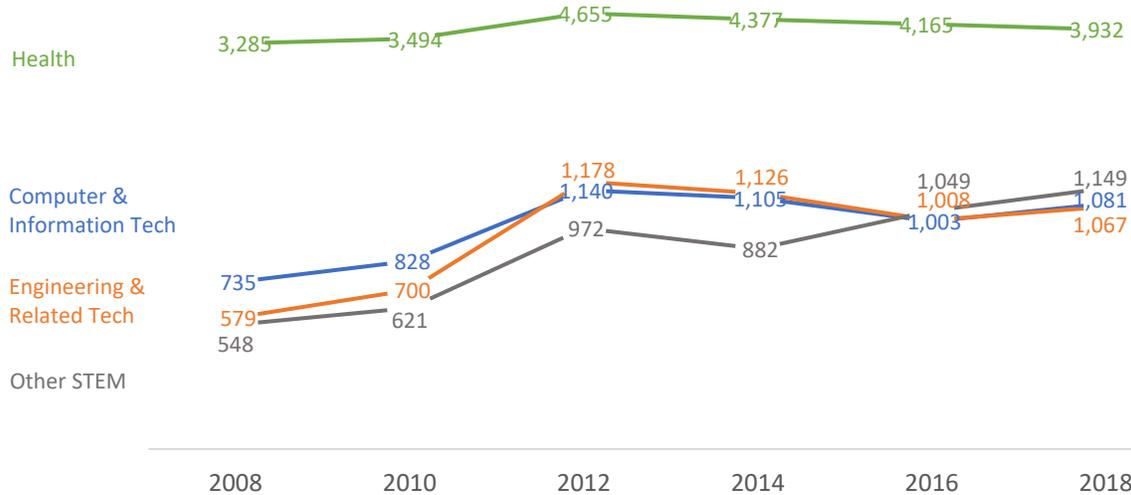
Over the course of recent years, the data indicate that continuous progress has been made in increasing degree and certificate production in high employer demand fields of study. Depending on the field and the educational level, progress in some areas has been more dramatic than others. But in all these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

Midlevel

Figure 13 shows midlevel degree and certificate production in health and a range of STEM fields from 2008 to 2018. Over this time 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 likely due to two factors: (1) a strengthening economy and (2) a competitive job market, which is driving aspiring applicants to increasingly choose to pursue a bachelor's degree over an associate degree.

Figure 13

Associate Degree and Midlevel Certificate Completions Washington, 2008-2018



Source: Integrated Postsecondary Education Data System (IPEDS).

Overall, health degree completions at the midlevel grew by nearly 22 percent from 2008 to 2018. Degrees in computer and information technology, engineering and related technology, and other STEM programs followed a similar pattern, peaking in 2012. After a period of declining numbers, they began to rise sharply 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 ten-year period from 2008 to 2018, midlevel STEM degree completions increased by 55 percent. The number of degrees awarded in the two years from 2016 to 2018 alone rose by 37 percent.

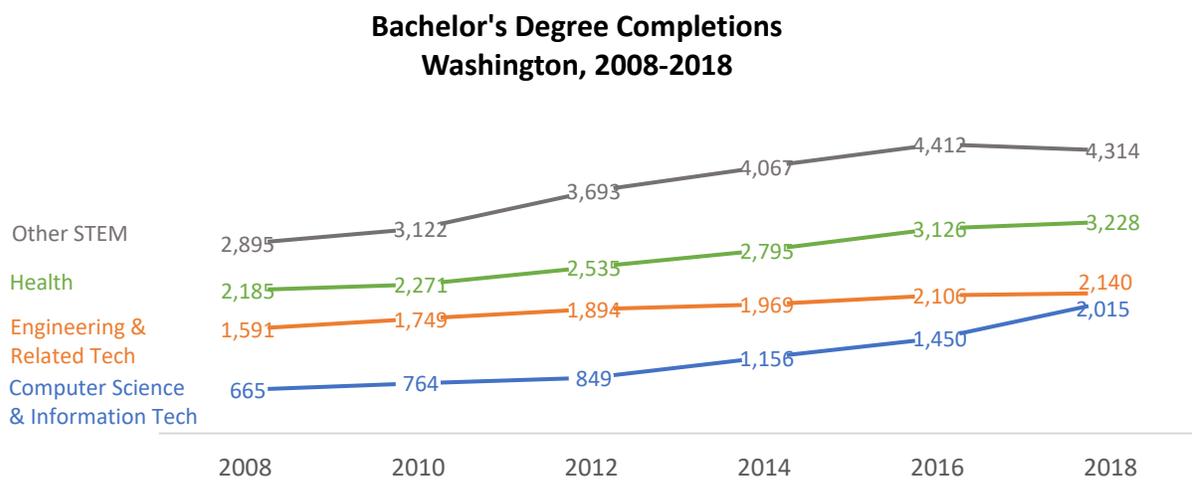
Baccalaureate Level

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 2008 to 2018. 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. This targeted funding has been critical in driving the expansion computer science bachelor’s degrees in the state. In just two years, from 2016 to 2018, completions have increased by almost 40 percent.

Figure 14

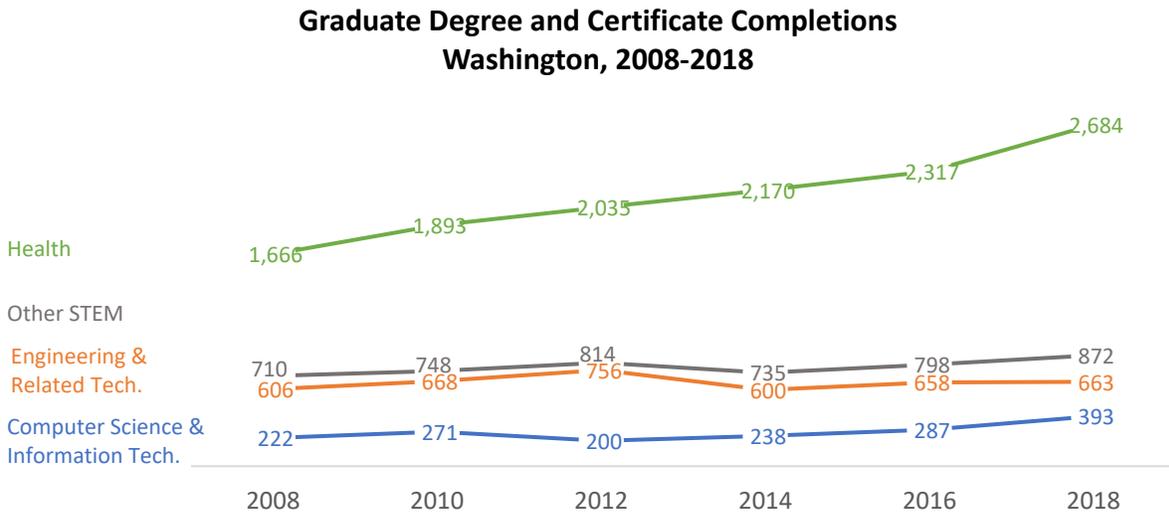


Source: Integrated Postsecondary Education Data System (IPEDS).

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 2008 to 2018. Computer and information science saw even faster growth, increasing by over 75 percent during this same time 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 fairly rapidly, reaching a low point in 2014. Since that time, however, completions have rose steadily.

Figure 15



Source: Integrated Postsecondary Education Data System (IPEDS).

Overall these completions figures show a positive trend. Postsecondary credentials are on the rise in Washington. But in order 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.¹⁴ 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.

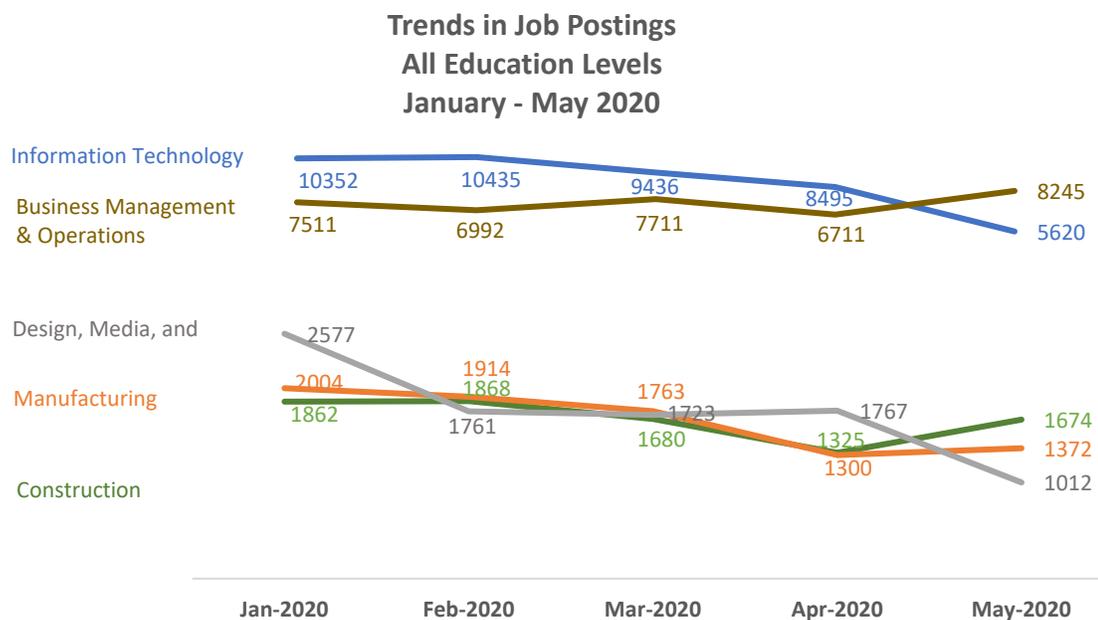
Current data show some gains in increased degree production in high demand fields at the middle skills, baccalaureate, and graduate and professional levels. However, workforce pressures are still surging, particularly in the STEM occupations. Skilled and educated workers are in demand at all education levels. 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.

This reflects the long-term trends. The advent of the novel coronavirus in the early months of 2020, however, has introduced a new complication in the workforce environment.

The COVID-19 Pandemic is Impacting Workforce Demand and Employment Opportunities

In its initial stages, the onset of the COVID-19 pandemic has had a significant impact on workforce demand in Washington, and it will likely have repercussions for some time. For example, Figure 16 shows the change in numbers of job postings for workers at all educational levels in a range of occupational fields from January to May 2020. Overall, postings declined substantially during this time period, particularly in the wake of the establishment of state guidelines on social distancing, the stay-at-home order, and temporary shuttering of many non-essential businesses. However, despite an overall decline, postings in some occupational groups showed a slight uptick in postings during the month of May, perhaps signaling early signs of a recovery.

Figure 16



Source: Labor Insight (Burning Glass Technologies)

Postings in information technology fell continuously and deeply between January and May, decreasing by 46 percent. In design, media, and communications they fell by 61 percent. We would expect jobs in information technology to be less impacted than other fields, due to the prevalence of options to work remotely at home in those occupations. But even with this advantage, jobs in information technology have not been untouched.

Job postings have declined sharply during the COVID-19 pandemic, with some fields showing tentative signs of an upturn in May. The decline in the fields of manufacturing (46 percent), construction (39 percent), and business management & operations (11 percent) was also considerable through April 2020. But in contrast to this downward trend, we see a slight increase in openings in these fields during the month of May. These may be the early signs of an economic recovery, as businesses across the state begin a phased reopening process.

The long climb out of the current recession will be challenging. With social distancing requirements, blue-collar jobs are more adversely affected than white collar jobs. White-collar jobs tend to be more easily transferable to a home environment. Blue-collar jobs, on the other hand, are more likely to require hands-on physical labor or face-to-face interaction, making work conditions challenging.

The Impact on Education

COVID-19 is having a major impact on the education side of the issue as well. The almost overnight elimination of classroom studies and the transition to online learning at home has put stress on both the state's K-12 and higher education systems. While schools and colleges have turned to online learning out of necessity, not all students have access to the technology necessary for plugging into this environment. It is uncertain when schools and colleges will be able to resume classroom teaching. In response, educational leaders and policymakers need to explore innovations that will make technology and online learning more available.

In a survey conducted from May 22-26, 2020, Washington parents with high-school age children were asked whether their child(ren)'s plans for postsecondary education after high school have changed due to the coronavirus epidemic or school closures?¹⁵ Among the respondents, 34.5 percent reported that their child(ren)'s plans have changed. Among those with changed plans, 63 percent indicated they are postponing postsecondary education. Others reported they are switching to an option closer to home (27.4%) or switching to a less expensive option (21.1%).

Further Studies Are Needed to Analyze Equity Gaps in the Labor Market

Further 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 needs, as we work through the COVID-19 pandemic crisis and beyond.

Appendix A: 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 in a given period.

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 2011–2015 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 the Employment Security Department's long-term occupational forecast of total openings for 2022–2027, issued in May 2019. For these projections, ESD relies upon methods established by the Bureau of Labor Statistics (BLS).

Recently, 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 afford a more realistic and complete picture of occupational demand going forward. 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 this change in methodology, see the Washington State Employment Security Department’s 2017 report.¹⁶

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 more accurately 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 Employment Security Department’s long-range forecast. Their methods rely on historical trends. Consequently, in some fields the projections numbers do not fully capture evolving demand for workers with particular 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 not available 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 workforce environment in Washington. Projections of job openings based on historical trends are limited in the ability to forecast employer demand going forward.

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