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# **A Skilled and Educated Workforce 2011 Update**

*An assessment of the number and type of  
higher education and training credentials  
required to meet employer demand*

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**A joint report**  
**Higher Education Coordinating Board**  
**State Board for Community and Technical Colleges**  
**Workforce Training and Education Coordinating Board**



# A Skilled and Educated Workforce

## 2011 Update

WASHINGTON  
**HIGHER  
EDUCATION**  
COORDINATING BOARD



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# **A Skilled and Educated Workforce 2011 Update**

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## A SKILLED AND EDUCATED WORKFORCE 2011 UPDATE

### Introduction

Washington's Strategic Master Plan for Higher Education sets aggressive goals for increasing degree production. The plan acknowledges a critical need for growth in Science, Technology, Engineering, and Mathematics (STEM) degrees and health related-programs, as our higher education system is expanded to meet the needs of students and the state. This report identifies additional high employer demand occupations and suggests further areas of targeted growth to meet the developing needs of the state's economy.

This is the third in a series of biennial reports published jointly by the Higher Education Coordinating Board (HECB), the State Board for Community and Technical Colleges (SBCTC) and the Workforce Training and Education Coordinating Board (Workforce Board) as required under RCW 28B.76.230. The 2004 statute directs these agencies to assess "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."

To fulfill its mandate, the report uses the long-range occupational forecast<sup>1</sup> as well as estimates of program graduates who would likely be entering the workforce.<sup>2</sup> A few limitations of the analysis should be noted that could impact the gaps reported at each level.

First, due to limitations of the long-range forecast, the report does not fully address the impact of new and emerging occupations and industries. The analysis also makes no adjustment for workers in jobs that require more or less education than they currently possess.

Finally, the analysis is not intended to explain the current employment market for recent graduates that is significantly affected by the Great Recession. Rather it is forward looking and assesses demand based upon future openings compared to current degree production and labor force participation rates.

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<sup>1</sup> Openings based on Average Annual Total Openings 2014-2019, Long-Term Occupational Projections, Washington Employment Security Department Labor Market and Economic Analysis Division. May 2011. [http://www.workforceexplorer.com/admin/uploadedPublications/1647\\_occlong.xls](http://www.workforceexplorer.com/admin/uploadedPublications/1647_occlong.xls)

<sup>2</sup> 2010 Completions by CIP Code (IPEDS) with adjustments based on workforce participation and continuing education described under the "Demand for Educated and Trained Workers" section of this report.

Net in-migration of educated workers was not included in the supply analysis in the report. The underlying reason is based on the assumption that the state wants to increase its internal supply of workers and decrease reliance on imported talent.

This update will cover two of three areas addressed in the 2009 report:

1. Aggregate Demand for higher education degrees and certificates to address workforce needs.<sup>3</sup>
2. Identification of High Demand Occupations by level of education.

A third subject area in the 2009 report, *analysis of demand for selected occupations and industry groups*, will be addressed in a series of follow-up briefs in the coming weeks and months.

A Skilled and Educated Workforce is part of a larger needs assessment system used by the HECB to assess the student, employer, and community demand for higher education. This system also includes regional and targeted analyses designed to address specific areas of concern or emerging needs.

More information is available at:

[www.hecb.wa.gov/AboutOurSystem/MaintainingStandards/InvestmentsNeeds/SystemDesign](http://www.hecb.wa.gov/AboutOurSystem/MaintainingStandards/InvestmentsNeeds/SystemDesign)

In general, this report indicates long-range gaps between current degree production and employer demand consistent with those forecast by the state's Strategic Master Plan for Higher Education.

It finds that:

- **To meet the projected needs of employers**, we will need an additional 9,000 completers at the mid-level; 10,000 at the bachelor's level; and 9,000 at the graduate level annually by 2019.
- **At the mid-level**, high demand fields are identified as health professions; installation, maintenance and repair; manufacturing and production; accounting and bookkeeping; protective services; and science technology.
- **At the baccalaureate level**, high demand fields are identified as computer science; engineering; health professions; life sciences and agriculture; and physical science occupations.
- **At the graduate level**, high demand fields are identified as: computer science; engineering; health professions; life science and agriculture; physical science; and human and protective service occupations.
- **Further analysis** is required in education, and media and communications occupations at all levels; and social science occupations at the baccalaureate level.

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<sup>3</sup> Including an "up skilling" adjustment to account for increasing education and training requirements in the workforce using the same basic approach applied in the 2009 report.



## Background

Several reports released in the last few years have expressed differing views on the future workforce needs of the nation's economy. In general these reports look at trends in the existing economy and/or the substantial gains in educational attainment in competing nations.

***What's It Worth? The Economic Value of College Majors***<sup>4</sup> argued that many more Americans need to complete a postsecondary degree or certificate to meet the needs of employers and help the U.S. maintain a competitive advantage as an innovative economy. The report noted that, "on average . . . bachelor's degree holders earn 84 percent more than those with a high school diploma."

***Certificates Count: An Analysis of Sub-baccalaureate Certificates*** states, "Economists and policymakers increasingly agree on the importance of human capital to economic advancement, both for individuals and for nations. This consensus is driven in part by research showing the labor market returns to even one additional year of schooling are significant. Long-term certificates have significantly higher labor market value than short-term certificates because of their greater technical and academic rigor, and because of the wider range of job-related skills they provide graduates. Certificates of one year or more are consistently linked to increased earnings."<sup>5</sup>

Other reports have taken a different tack, questioning the wisdom of unbridled expansion of higher education. ***From Wall Street to Wal-Mart: Why College Graduates Are Not Getting Good Jobs***<sup>6</sup> pointed out that many of the jobs being created in the U.S. require much lower levels of education and training. Still other reports such as ***Degrees for What Jobs?*** have focused more on demand by field of study as opposed to an aggregate demand for higher education.<sup>7</sup>

The approach in Washington has been to set aggressive goals for increased levels of educational attainment, while also balancing different forms of postsecondary education. The state's ***Strategic Master Plan for Higher Education in Washington*** recognizes there are unique needs for talented workers at all levels.

A recent analysis from Washington State Academy of Sciences pays particular attention to the need for workers in Science, Technology, Engineering and Math (STEM) fields.<sup>8</sup> Another release from the Workforce Development Council of Seattle finds high levels of demand in a number of health, manufacturing, and transportation and logistics occupations. The findings are generally consistent with the current and prior editions of ***A Skilled and Educated Workforce***.

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<sup>4</sup> What's It Worth? The Economic Value of College Majors. Carnevale, Strohl, Melton 2011.

<sup>5</sup> Certificates Count: An Analysis of Sub-baccalaureate Certificates. Bosworth 2010.

<sup>6</sup> From Wall Street to Wal-Mart: Why College Graduates are not Getting Good Jobs. Vedder, Denhart, Matgouranis, Robe 2010.

<sup>7</sup> Degrees for What Jobs? Raising Expectations for Universities and Colleges in a Global Economy. Sparks, Waits 2011.

<sup>8</sup> "STEM Education in Washington State: The Facts of the Matter." Summary of the Proceedings of a Symposium, Rising Above the Gathering Storm: STEM Education in Washington State. Washington State Academy of Sciences. December 2011.

## Demand for Educated and Trained Workers

While this report focuses on analysis of projected openings and the education and training required to succeed in those fields, it also is important to touch on other indicators of demand for educated workers.

At the macro level, two of the key indicators of demand are wage and unemployment rates. In Washington, as in the nation, we see a stable and consistent relationship between these indicators and education level. On average, earnings rise and unemployment rates go down with additional years of formal training and education (see Appendix A). With that said, on both of these indicators we also find significant variation by occupation and major field of study, and for wages we see significant individual variation as well.

Although in-migration has been a key source of talent in Washington over the last two decades, in-migration was not included in the supply analysis for this report. The underlying reason is the assumption that the state wants to increase its internal supply of workers and decrease reliance on imported talent.

Washington is a growing state, so we expect in-migration generally. However, Washington appears to rely heavily on workers trained in other states and nations to meet the needs of the economy, particularly at the graduate level.

Between 2005 and 2009, Washington annually attracted a net of nearly 5,000 workers each year at the bachelors and graduate levels, and more than 1,400 at the mid-level.<sup>9</sup> The 2010 Washington State Population survey shows that nearly two thirds of working adults who moved to Washington did so for job related reasons (see Appendix B).<sup>10</sup>

Analysis by the Workforce Board of H1-B visa petitions shows that in 2010, Washington employed 17,800 H1-B visa holders, and that the majority of new visa activity (approximately 75 percent) was to meet demand for computer and mathematical occupations.<sup>11</sup>

These analyses help set the context for the analysis of supply and demand of educated and trained workers in Washington. As stated in the Strategic Master Plan for Higher Education, "We will reduce employers' need to import people with advanced degrees or specialized skills from other states and countries. The best jobs in Washington will go to Washingtonians educated in our colleges and universities."<sup>12</sup>

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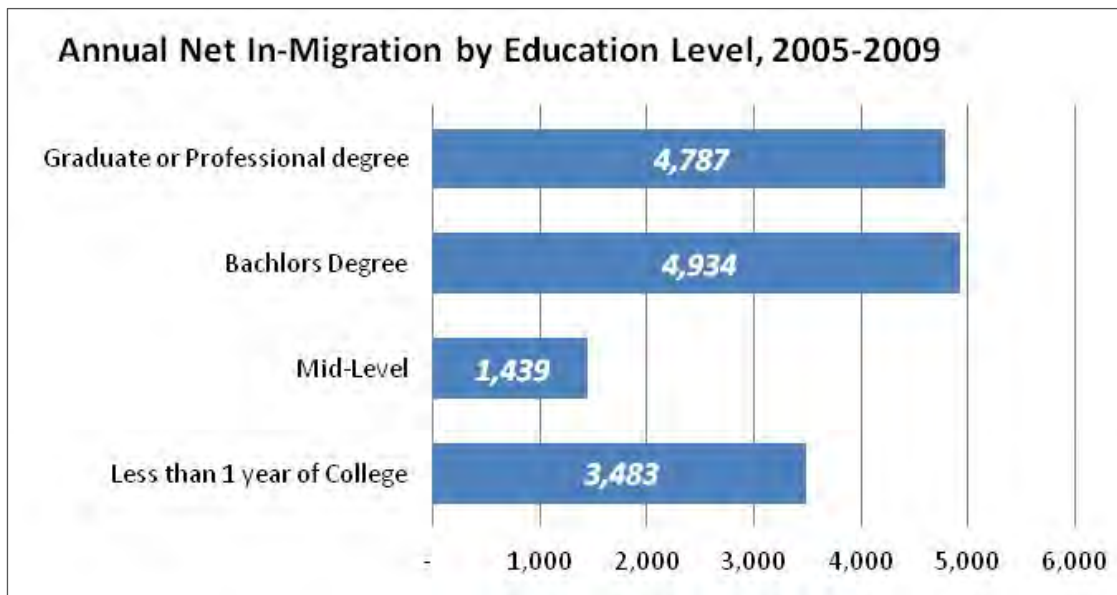
<sup>9</sup> 2012 Key Facts about Higher Education in Washington, "Washington is importing college-educated workers to meet demand," Higher Education Coordinating Board, January 2012.

<sup>10</sup> HECB Analysis of 2010 Washington State Population Survey data.

<sup>11</sup> "H-1B Workers in Washington: Helping Fill an IT Skills Gap." Workforce Training and Education Coordinating Board, December 2011. <http://www.wtb.wa.gov/Documents/H-1BReport2011.pdf>

<sup>12</sup> 2008 Strategic Master Plan for Higher Education in Washington. HECB 2007.

Figure 1: Annual Net In-migration by Education Level



Source: HECB analysis of 2005-2009 ACS.

### State-Level Supply and Demand for Educated and Trained Workers

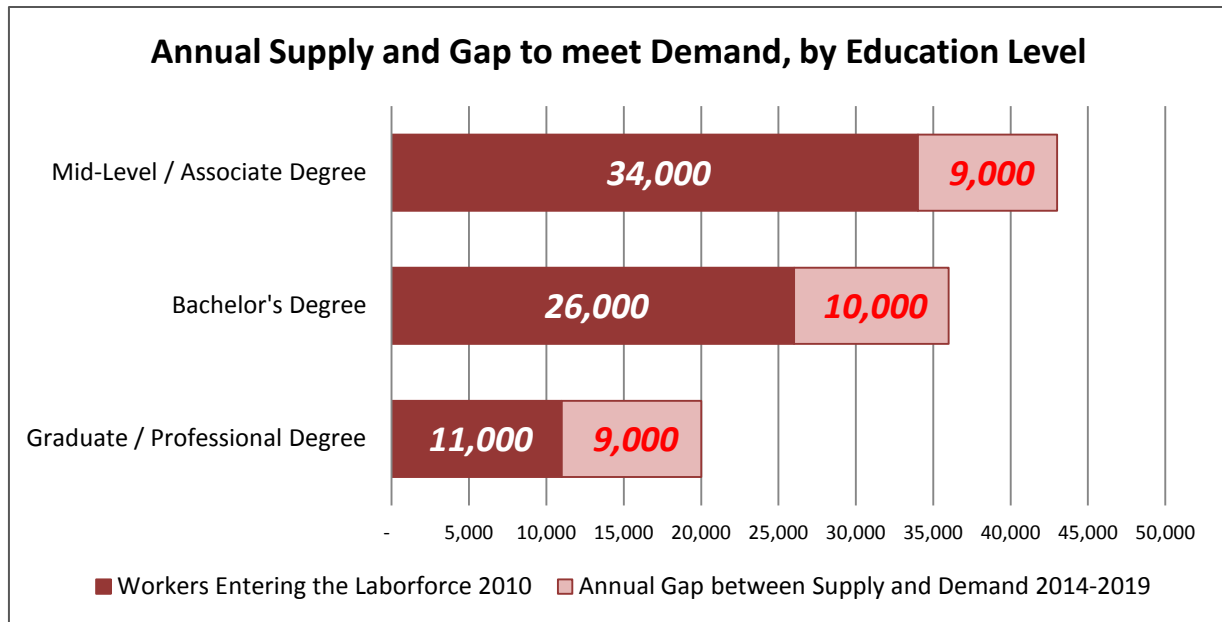
The Employment security department estimates that 3.2 million people were employed in Washington in 2009. Nearly two thirds of them have a year or more of postsecondary education and the percentage who hold formal degrees at the associate level and above is growing.

As our economy grows, demand for workers prepared at all levels will continue to grow. However, the focus of this report is on training and education that prepares people for jobs that require one or more years of postsecondary education so that it can inform policy makers and program planners in the development of new programs and the expansion of existing programs.

At the aggregate level, Washington needs to add capacity at all education levels. Estimated annual openings between 2014 and 2019 are 38,000 at the mid level; 33,000 at the bachelor's level; and 19,000 at the graduate level (see Appendix C).

To fill these projected openings, we will need an additional 9,000 completers at the mid-level; 10,000 at the bachelor's level; and 9,000 at the graduate level annually in addition to our current annual production (see Figure 2).

Figure 2: Annual Supply and Gap to meet Demand by Education Level



The analysis looks at 2010 graduates who are likely to enter the labor force (see Appendix D) compared to the number of expected openings based on the 2014-2019 annual average openings as described in the May 2011 Long-Term Employment Forecast.<sup>13</sup>

Openings are assigned to an education level based on the training level of the existing workforce plus an adjustment for “up skilling” in recognition of increasing educational requirements of occupations.<sup>14</sup>

Once the gap is calculated, two additional steps are necessary to estimate the number of additional completers who are required at each level.

- First we need to add to the gap to account for the fact that not every additional graduate will enter the labor force.
- Next we need to add to the gap an estimate of the number of workers who would likely continue their studies to help meet demand at the next level. The calculation is shown in Appendix E.

The final analysis presented in Figure 2 provides an estimate of additional graduates needed to meet demand at each education level, taking into account increasing education and training requirements and the completions needed to prepare for additional education.

<sup>13</sup> Openings based on Average Annual Total Openings 2014-2019, Long-Term Occupational Projections, Washington Employment Security Department Labor Market and Economic Analysis Division. May 2011. [http://www.workforceexplorer.com/admin/uploadedPublications/1647\\_occlong.xls](http://www.workforceexplorer.com/admin/uploadedPublications/1647_occlong.xls)

<sup>14</sup> “Base” education level is based upon the education levels of the Washington civilian workforce age 25-64 as reported in the 2010 American Community Survey. Up skilling is based upon the annual change between 2000 Census and 2010 ACS.

## Identification of High Employer Demand Occupations

Identification of High Employer Demand occupations is a two-step process:

- **First is the identification of gaps** between the numbers of graduates who would likely enter each occupation based on the current distribution of the workforce.
- **Second is an assessment of the gaps** to determine whether there are sufficient graduates in related fields with adequate supply to meet the needs or if additional graduates in specific fields would be needed to meet demand.

It is important to note that all occupations draw on a range of skill and training levels. While the demand is presented in terms of training level, in some cases demand may be met by individuals with more or less training. The education levels by occupation are estimated based on the current distribution of the Washington workforce, ages 25-64, using the 2010 American Community Survey.

### *Mid-level*

The mid-level 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, as well as students who attempted at least 45 credits at a public four year college, but did not complete a degree.

The analysis shows a high demand for a number of areas where there is a gap between the current supply and the forecasted demand. Figure 3 shows a more than 50 percent gap between supply and demand in some areas.

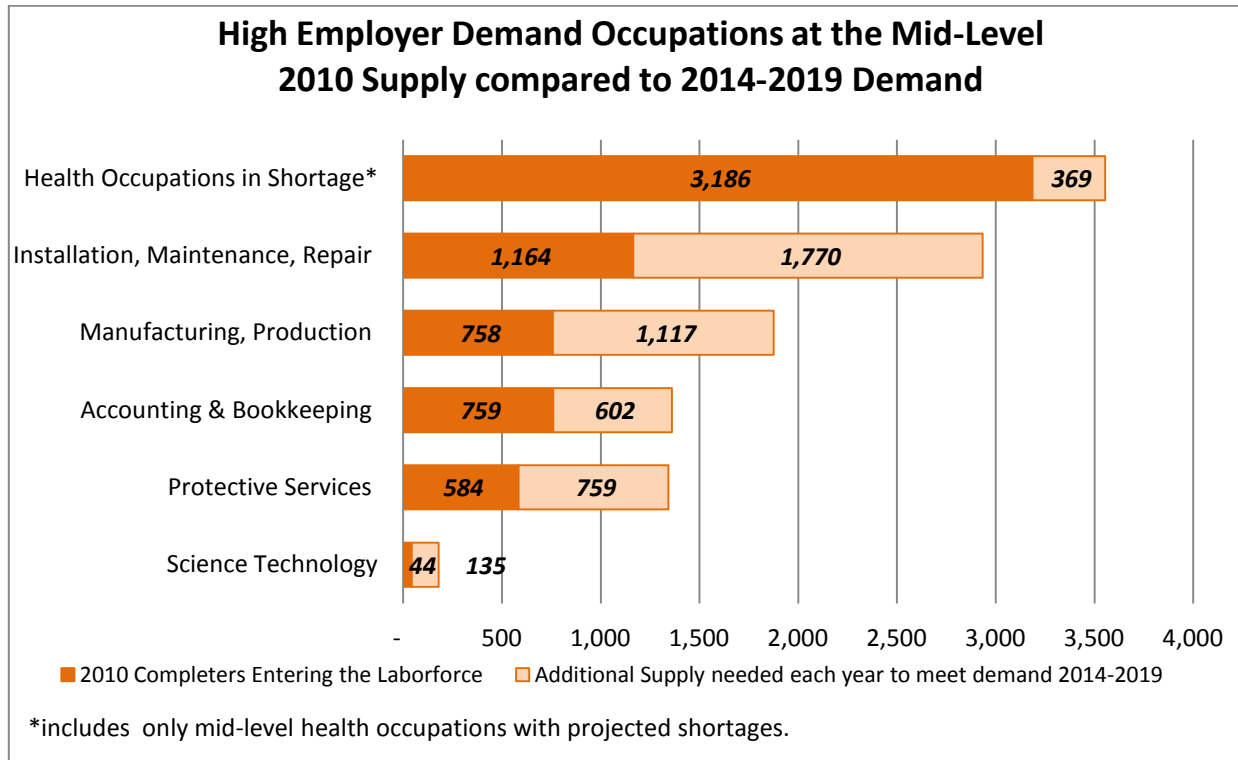
### **The analysis depicted in Figure 3 finds a need for more than**

- 1,700 additional certificates and degree completers prepared to work in installation, maintenance, and repair;
- 1,100 in manufacturing and production;
- 700 in health occupations and protective services;
- 600 in accounting and bookkeeping; and
- Nearly 100 in science and technology.

It is important to note that recent increases in Boeing orders have yet to be reflected in detailed labor market forecasts for the aerospace industry. Analysis has consistently shown demand in health-related fields at the mid level. Progress toward closing the gap has been made.

An excellent example is the responsiveness to the health care shortage. Between 2002 and 2011, the community and technical college system increased its registered nursing program completions by from 799 to 1,704 (113 percent). Further detail on health occupations in demand is provided in Appendix F.

**Figure 3: High Employer Demand Occupations at the Mid-Level**



**Bachelor’s Level**

At the baccalaureate level, graduates are matched to openings based on the current distribution of majors and occupations as reported in the 2009 ACS for working age employed adults in Washington.<sup>15</sup> Figure 4 shows the high demand occupations at the bachelor’s level.

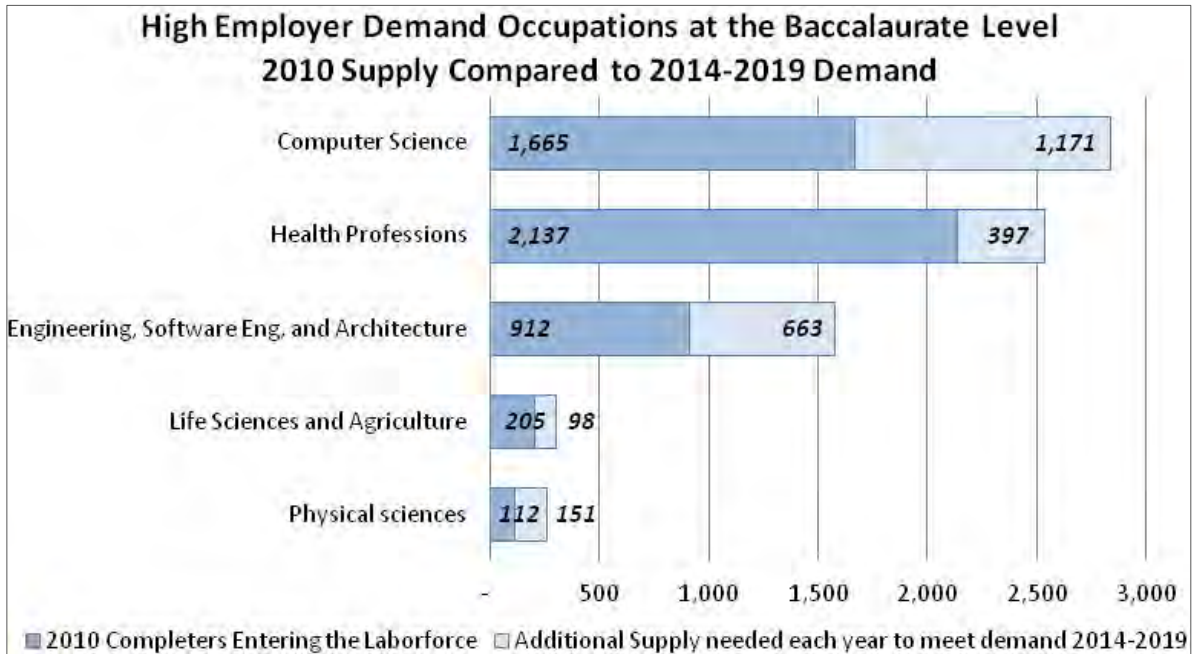
Since the first report in 2006, this analysis has consistently shown demand in computer science, engineering, and health fields at the baccalaureate level and above. These fields rely significantly on graduates trained in specific programs, and in many cases licensure or certification is either a required or preferred condition of employment. The analysis shows a need for nearly 1,200 additional baccalaureate graduates prepared to work in computer science, nearly 700 in engineering, nearly 400 in health occupations, and 250 in physical and life sciences.

The Washington Government Management Accountability and Performance (GMAP) report shows degree production has increased in most of these areas. The exception has been Computer Science where completions have been flat.<sup>16</sup> The rate of increase has not been sufficient to close the gaps. The analysis also finds gaps in service, social science, media and communications, and administrative/clerical occupations.

<sup>15</sup> HECB analysis of 2009 ACS. Cross tabulation of Occupation and Major Field of Study. Civilian employed Washington residents age 25-64 with bachelor’s degree, not enrolled in school.

<sup>16</sup> Government Management Accountability and Performance (GMAP). Higher Education Measure 3.2 High Demand Degrees and Certificates. <http://www.accountability.wa.gov> - Retrieved 2/7/2012.

**Figure 4: Gap occupations at the Baccalaureate level.**



Graduates from a range of fields and/or education levels may be competitive candidates for many of these occupations and therefore the occupations would not be considered high demand. This is clearly the case for service occupations and administrative/clerical occupations.

Within media and communications we find a few occupations that require specialized training such as multi-media artists and animators and graphic designers, however others, like public relations specialist, rely on more general writing and communication skills that may be developed in a range of academic fields. Social sciences, and media and communications may include high demand occupations, but those groups require further analysis to identify specific shortage fields.

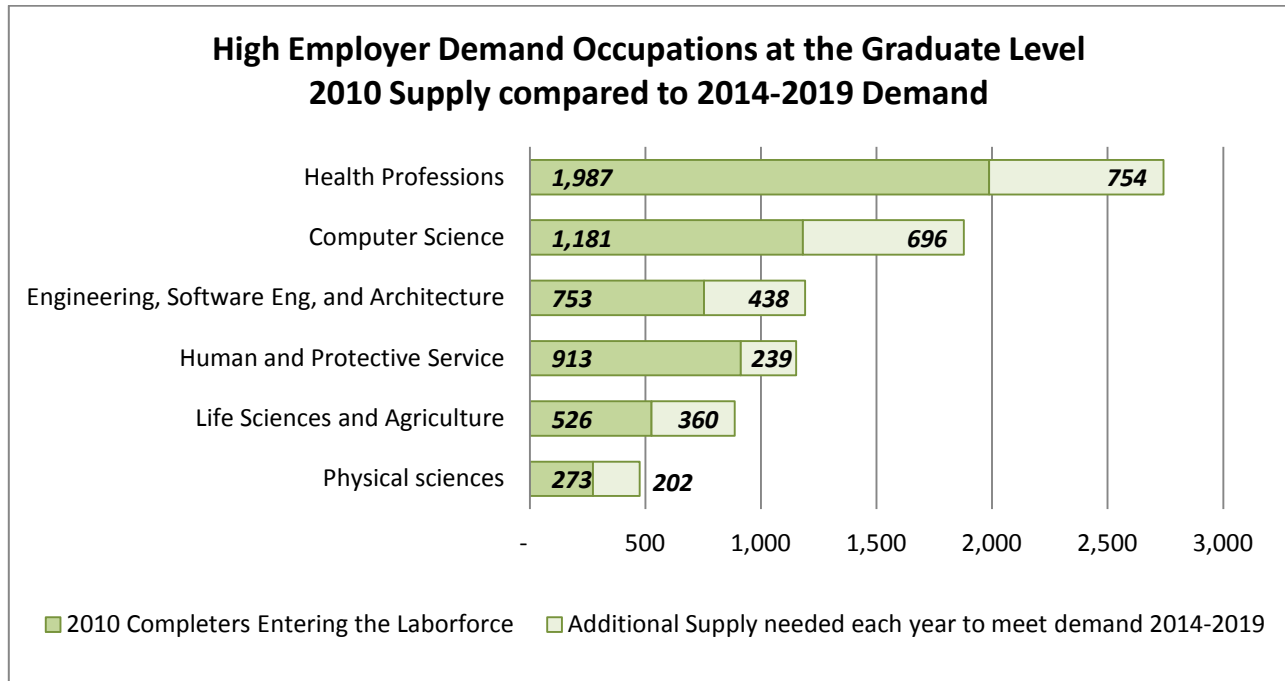
**Graduate Level**

At the graduate level a similar analysis is provided, however, we do not have data on graduate field of study so graduates are matched to occupations based on Classification of instructional program (CIP) and Standard Occupational Classification (SOC) crosswalk available from the National Center for Education Statistics (NCES).<sup>17</sup>

Figure 5 shows occupations identified as high demand at the Graduate level are at least 10 percent greater than 2010 supply. The analysis shows gaps of nearly 700 graduates in computer science occupations; more than 750 in health occupations; more than 400 in engineering occupations; more than 350 in life sciences and agriculture; more than 200 in physical sciences; and nearly 250 in human and protective services.

<sup>17</sup> National Center for Education Statistics. “Classification of Instructional Programs (CIP) – 2010 mapped to Standards Occupational Classification (SOC) – 2010.”

Figure 5: Gap occupations at the Graduate level.



The GMAP report shows degree production has increased in tracked high demand fields at the graduate level. Consistent with the bachelor’s level analysis, degree production has not increased quickly enough to close the gaps.

The analysis also finds gaps for media and communication and human and protective service. As described above gaps have been clear and persistent in computer science, health and engineering occupations.

Gaps in life sciences and agriculture, and physical science also are consistent with expectations and other analysis. Nearly 60 percent of the graduate level openings in life sciences and agriculture are for medical scientists. More than half the graduate level openings for physical scientists are for environmental scientists with large numbers of openings for chemists and geoscientists as well.

Human and protective service includes a wide range of occupations, some of which have fairly specific training and certification or licensing requirements. For example, the estimate includes numerous openings for counselors and therapists that would require department of health licensing.

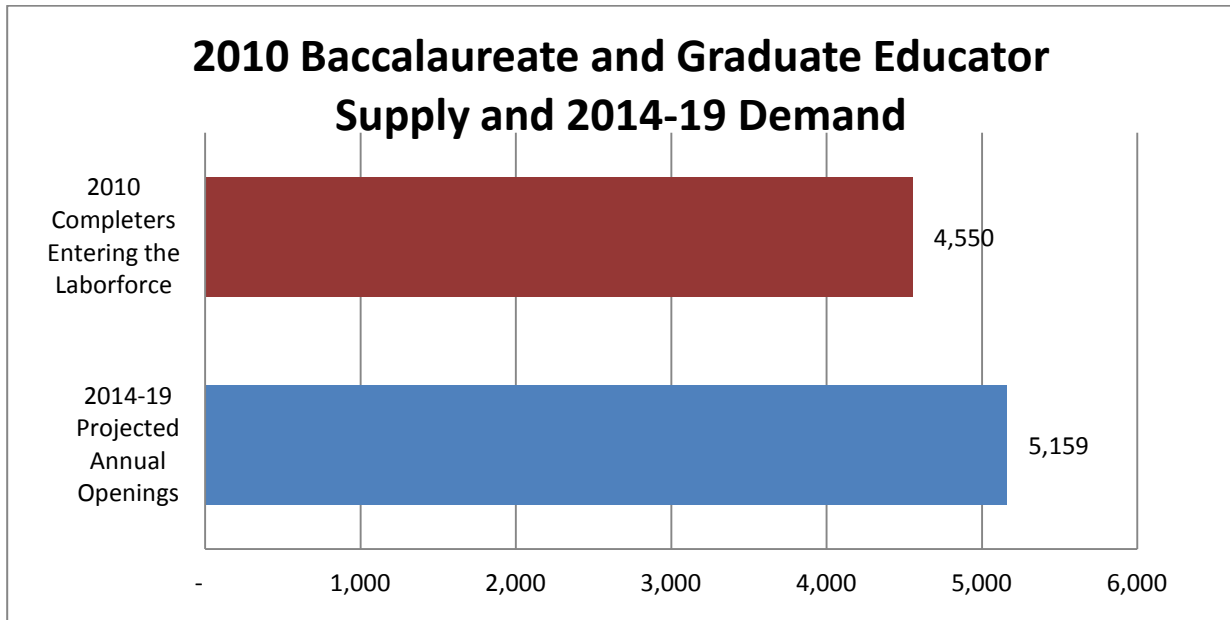
As indicated in the discussion of baccalaureate gaps, demand for media and communications is less clear. Many positions can be filled by graduates from a variety of backgrounds, but there also are significant openings with fairly specific training requirements such as multi-media artists and animators and graphic designers. Within the media and communications occupational group there may be specific areas of shortage as well but further analysis will be required to better understand needs in this area.



## Education

Supply and demand for educators is calculated based on the needs at the bachelor's level and above. Figure 6 shows an overall gap of more than 600 educators between current supply and 2014-2019 annual average demand.

**Figure 6: Supply and Demand for Educators**



There are three key issues in education gap analysis that will require further study.

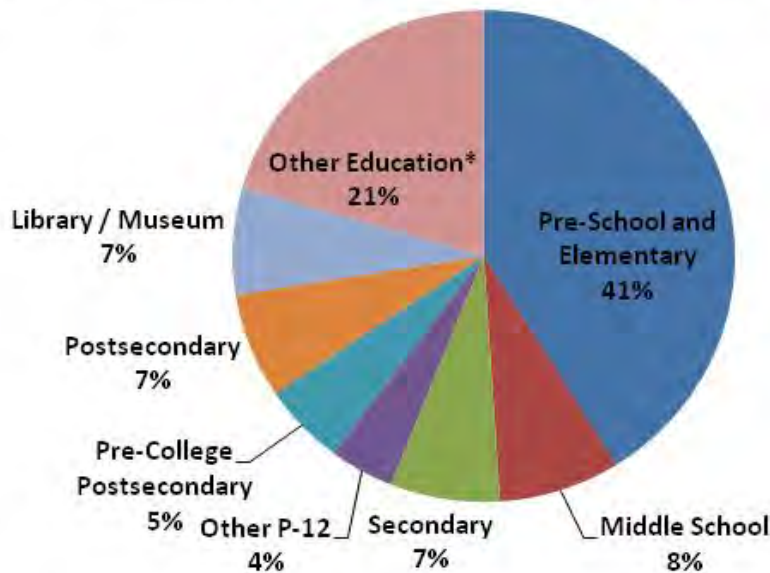
1. The educator's group includes educators at all levels (pre-school through higher education). Within those levels, there are a variety of training requirements. For example, certified teachers may receive initial training at the bachelor's level, post bachelor's certificate, or Master's level. In addition, 50 percent of education majors are CTC transfer students.<sup>18</sup>
2. Further training often is required, and in K-12 currently there is an explicit financial incentive for training beyond mandated professional development requirements. The analysis only looks at openings so it does not explicitly address the need for further professional development.
3. The educator's occupation analysis also misses a number of openings required to meet the needs of public and private institutions. For example, education administrators are listed under the business and management occupational group; school counselors are listed under social science; and school nurses are grouped under health. The CTC system plays a significant role in the supply of educators.

<sup>18</sup> "The Role of Transfer in the Attainment of Bachelor's Degrees at Washington Public Baccalaureate Institutions, Class of 2006." Social & Economic Sciences Research Center. June 2009. <http://www.hecb.wa.gov/sites/default/files/HECBTransferStudyFINAL.pdf>

Figure 7 shows the distribution of education openings. About 60 percent of the openings are in K-12. Within K-12 the employment projections break out demand by level and special education, but not by subject area. The Professional Educators Standards Board (PESB) has conducted a series of regional meetings to learn more about recruitment and hiring processes, challenges, and potential solutions.

**Figure 7: Distribution of Education Openings**

**Educator Openings 2014-19, by level and type**



\*Note: Other Education includes "Instructional coordinators," "Teacher assistants," "Education, training, and library workers," "All other," "Farm and home management advisors," and "Teachers and instructors"

The PESB’s report finds that educator demand is a complex issue, confounded by policies that incentivize poor human resource practices, including late hiring. The regional dialogues and follow up survey conducted by the PESB revealed common perception of shortage that was more a consequence of late hiring and geographic proximity than of inadequate production.

The report also cites districts’ lack of ability to make good projections as a critical issue in the recruitment and hiring process. They conclude that a combination of policy changes, improved collaboration between school districts and preparation programs, and enhanced analytics from organizations such as the state’s Education Research and Data Center (ERDC) are essential for closing the gap between supply and demand.<sup>19</sup>

<sup>19</sup> Educator Workforce Regional Meetings: A Report to the Governor and Washington State Legislature on the Status of Requirements in SB 6696, 2010 Legislative Session. Professional Educators Standards Board. January 2012 [http://www.pesb.wa.gov/press\\_release/1-25-12\\_workforce](http://www.pesb.wa.gov/press_release/1-25-12_workforce)

Overall, building capacity to match Washington’s future educator workforce demand is critically important. However, to have actionable demand data, programs need information as it relates to location and specific credentialing. Also, programs will want to be assured that economic factors have been controlled for, such as changes in educator retirement, transitions, or turnover. Finally, they will need to be confident factors such as demographics and public policies have been considered. Further analysis of demand for educator needs will be conducted jointly with the Professional Educators Standards Board.

At the postsecondary level, demand is broken out by broad subject area. Training for postsecondary educators generally occurs at the master’s or doctoral level within the given discipline. However, more than 20 percent of the openings are for postsecondary vocational education teachers. The requirements in this area generally include a mix of industry experience, technical expertise, and a bachelor’s degree or higher.

## Closing the Gaps

One primary mission drove Washington Learns<sup>20</sup> final report and its recommendations:

*“To be competitive in the global economy, we must educate more people to achieve at higher levels.”*

We must hold our students to educational standards that are at least as high as those used in other states and nations. Put simply, we must educate all Washingtonians to a level that makes them competitive worldwide.”<sup>21</sup>

The gaps between supply and demand demonstrate a clear need for our education system to keep building on its successes. The analysis also provides critical information about where targeted resources are needed to meet the demands of the economy and provide Washington residents with access to the best opportunities for success.

Clearly, we need to focus on key fields that support some of our largest industries and employers. These include installation, and repair and manufacturing and production at the mid-level, and engineering and computer science at the bachelor’s and graduate level. In addition, to support those industries and the growing Washington population, there are needs for additional graduates prepared for jobs in health care, protective services, and accounting and bookkeeping.

It is important to recognize too that as we utilize resources to address these critical occupations, we still need to maintain our flexibility and responsiveness for other activities in the economy as they emerge. As the state grows, jobs will continue to grow in all occupational groups and industry sectors.

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<sup>20</sup> Washington Learns was a review of the entire state’s education system—early learning, K-12, postsecondary education and workforce training.

<sup>21</sup> Washington Learns World-Class, Learner-Focused, Seamless Education, Nov. 2006.  
<http://www.washingtonlearns.wa.gov/report/FinalReport.pdf>

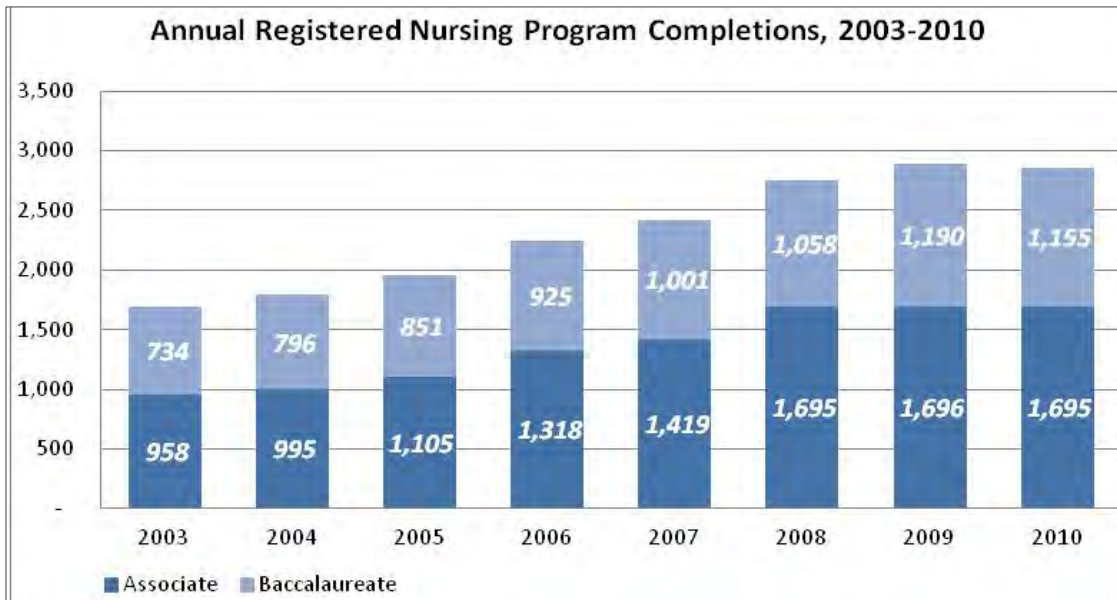
In addition, we need to continue to recognize that many occupations draw on talented individuals who are trained in a variety of disciplines and at a variety of levels. To demonstrate this point Appendix F outlines the most prominent major fields of study at the baccalaureate level associated with each occupational cluster. By building consensus about where these gaps exist and focusing resources on addressing them we can make progress and meet the needs of our economy.

Progress in degree production for Registered nurses provides a great example of what can be done when the entire system is working toward the same goal. Since 2003 we have increased the annual number of Associate and Bachelor’s level nursing graduates by more than 68 percent (Figure 8). This was possible because state agencies, public and private institutions, labor, and the industry remained focused on the nursing shortage over the long term and the Legislature and the governor provided support for growth in this area.

We are at the early stages of arriving at a similar consensus about the needs in the aerospace industry. As we begin to focus resources more intensively on this area, we are positioning ourselves to make great progress in meeting those expanding needs.

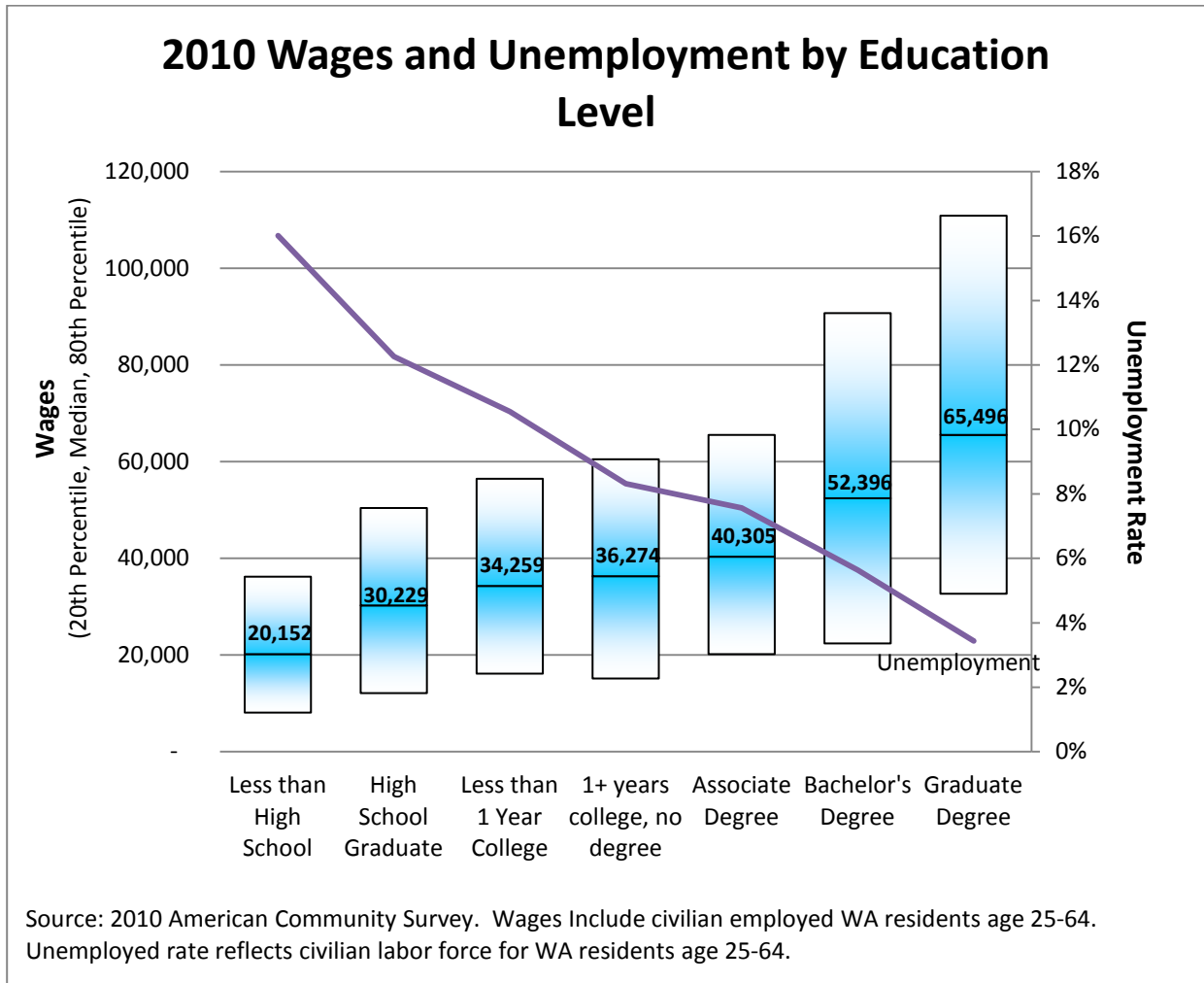
By decreasing our dependence on imported labor and providing greater opportunities to Washington residents, we make Washington a more attractive location for business expansion and we provide greater opportunities for our residents and the prosperity of the state.

**Figure 8: Annual Registered Nursing Completions 2003-2010**

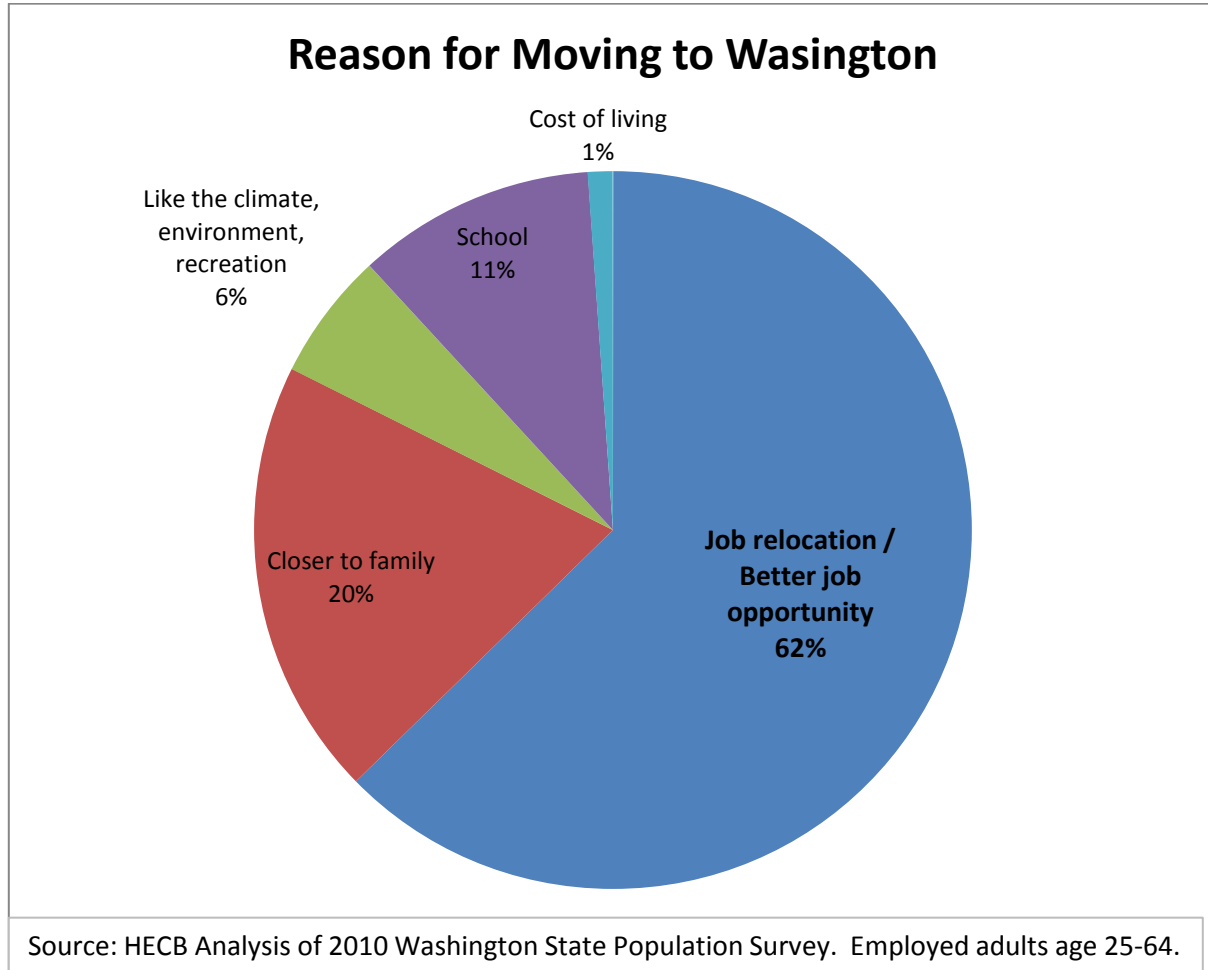


Source: Health Professions Education in Washington State: 2003–2010 Completion Statistics. Workforce Training and Education Coordinating Board, 2011

### Appendix A: Wages and Unemployment



### Appendix B: Reason for Moving to Washington



### Appendix C: Long Term Employment Projection

	Estimated Workforce 2009	Estimated Workforce 2019	Estimated Annual Avg. Openings due to Growth 2014-2019	Estimated Annual Avg. Openings due to Replacement 2014-2019	Average Annual Total Openings 2014-2019
Less than a year of College	1,155,757	1,195,164	16,488	25,949	42,437
Mid-Level	897,736	1,065,635	14,701	23,137	37,838
Bachelor's	761,046	931,909	12,856	20,234	33,090
Graduate	421,189	538,148	7,424	11,684	19,108
<b>Total</b>	<b>3,235,727</b>	<b>3,730,856</b>	<b>51,470</b>	<b>81,004</b>	<b>132,474</b>

### Appendix D: Supply of Workers Available to Meet Employer Demand

Calculation of Workforce Supply					
Degree	Completions	Labor force Discount Factors			"Workforce Supply"
		Enrolled & employed part-time, or unemployed	Military	Not in Laborforce	
Mid-Level Degree Completers	100%	5.5%	3.2%	19.1%	72.2%
Bachelor's Degree Completers	100%	1.9%	1.7%	12.3%	84.1%
Graduate Degree Completers	100%		1.3%	10.1%	88.6%

Source: 2010 American Community Survey. Washington Residents Age 25-34



### Appendix E: Calculation of Aggregate Gap

Estimated 2019 Supply-Demand Gap								
Education Level	2010 Degree Production	2010 "Supply"	2019 Demand (includes upskilling)	Projected 2019 Supply Gap (base demand estimate)	Additional Completers who do not enter the labor force*	Additional Graduates Needed to Go On to Further Education**	Additional Completions needed by 2019	Total Degrees needed in 2019
Mid-level	46,426	33,536	37,838	4,302	707	3,820	8,829	42,365
Bach. Degree	30,551	25,701	33,090	7,389	789	1,937	10,115	40,666
Grad./Prof. Degree	12,132	10,750	19,108	8,359	742	-	9,101	21,233

\* Adjustment due to graduates who do not enter the labor force based on ACS Laborforce participation of completers at each level who are not enrolled. Adjustment is 16.44% at Associate level; 10.68% at Bachelor's; and 8.88% at graduate level.

\*\* Mid-level based on percentage of bachelor's completers who are CTC transfer students as reported in the HECB 2009 Role of Transfer in the Bachelor's degree study. Bachelor's level is based on the percent of the under 25 population with a bachelor's degree who are enrolled in a graduate education program (2010 ACS).

## Appendix F: Occupations and Majors

Occupational Category	Primary Feeder Programs
<b>Educators</b>	Education, Humanities and Communication
<b>Computer Science</b>	Computer and Information Science, Engineering Tech, and Architecture, Business & Management
<b>Health Professions</b>	Health
<b>Service Occupations</b>	Humanities and Communications, Business and Management, Social and Behavioral Science
<b>Engineering, Software Eng, and Architecture</b>	Engineering, Software Engineering, and Architecture
<b>Social Sciences</b>	Family and Consumer Sciences, Humanities and Communication, Business and Management
<b>Physical Sciences</b>	Physical Sciences, Agriculture and Life Sciences
<b>Agriculture and Life Sciences</b>	Agriculture and Life Sciences, Family and Consumer Sciences
<b>Legal</b>	Business and Management, Humanities and Communication, Social and Behavioral Sciences
<b>Technicians (all life, physical, and social science)</b>	Family and Consumer Sciences, Humanities and Communication

### Appendix G: Shortage Health Occupations

