

WASHINGTON  
**HIGHER  
EDUCATION**  
COORDINATING BOARD

**SB  
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**COMMUNITY & TECHNICAL  
COLLEGES**



## **A Skilled and Educated**

### **Workforce:**

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

### **A joint report:**

**Higher Education Coordinating  
Board**

**State Board for Community and  
Technical Colleges**

**Workforce Training and  
Education Coordinating Board**

**January 2006**

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# **A Skilled and Educated Workforce**

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## Executive Summary

When the legislature and governor enacted House Bill 3103 in 2004, they intended, in part, to improve the quality of information available to help policy makers assess the needs of Washington employers compared with the “output” of the state’s higher education system. A key section of HB 3103 directed the Higher Education Coordinating Board, the State Board for Community and Technical Colleges, and the Workforce Training and Education Coordinating Board to produce every other year:

*“...an assessment of the number and type of higher education and training credentials required to match employer demand for a skilled and educated work force. The assessment shall include 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 following document is the first joint report published by the three agencies in response to the 2004 statute. It analyzes the workforce supplied by higher education in Washington; employer demand for higher education as measured by the number of projected job openings; and the match between supply and demand.

This report represents one facet of a larger statewide higher education needs assessment that was produced by the HECB in October 2005, also in response to HB 3103. In contrast to the larger statewide assessment, which examines employer, community and student demands for education and training at the baccalaureate level and above, the following report compares employer demand to 2012 and the current output of students from one year of college through post-baccalaureate education.

The results of this report indicate:

- The state’s current supply of workers who have completed mid-level preparation—more than one year but less than four years of postsecondary training or education—will meet only 83 percent of the expected employer demand during 2007-2012.
- Increasing the supply of workers with mid-level preparation at the rate of population growth will not close the gap and meet employer demand. It will take policy changes to increase sufficiently this sub-baccalaureate capacity.
- A mismatch exists between the supply and demand of workers prepared for occupations requiring preparation at the baccalaureate level and above. Specifically, Washington does not produce enough graduates at those levels to meet employer demand for workers in a number of fields, most notably computer science, engineering, and health care.
- The higher education system will need to expand at the baccalaureate level in a range of academic and professional fields to meet specific occupational needs. Also needed are increased numbers of students who earn professional and doctoral degrees annually.

This report relies on the best estimates of the preparation needs of workers required to meet the labor needs of Washington employers, yet these estimates do not fully consider other aspects of demand for degrees and programs, including employer preferences (as distinguished from employer needs for students who have learned particular occupational skills), student demand, or community demand. These additional factors are discussed in the *2005 State and Regional Needs Assessment* published by the HECB.

## Introduction

Employers consistently demonstrate a preference for better educated workers and, in many cases, the education level of the workforce in a given region and proximity to a higher education institution are critical factors a firm considers when deciding where to start or expand operations. However, despite increases in the number of students receiving postsecondary education, employers continue to report difficulty hiring trained workers at all levels of education. The Washington State Workforce Training and Education Coordinating Board conducts a survey of employers every two years. With results that are generally consistent with prior years, the 2004 survey finds that “employers believed skill shortages were hurting their business by limiting output or sales, lowering productivity, and reducing product quality.”<sup>1</sup>

In an effort to create a better understanding of employers needs for trained workers the legislature, in 2004, directed the HECB to produce, jointly with the State Board for Community and Technical Colleges and Technical Colleges and the Workforce Training and Education Coordinating Board, a biennial assessment of the gap between the number of forecast net job openings at each level of higher education and number of prepared workers with the appropriate preparation and credentials needed to meet that demand.

This report provides an analysis of labor market demand for education and training in Washington and the supply of workers prepared in Washington institutions and training programs<sup>2</sup>. The aggregate gap in supply and demand for education and training at the sub baccalaureate level and the gap in supply and demand for specific occupational categories at the baccalaureate level and above are discussed. The report relies on our best estimate of the preparation needs for Washington employers, yet these estimates do not fully consider other aspects of demand for degrees and programs including employer preferences<sup>3</sup>, student demand, or community demand. These three other factors are discussed in the *2005 State and Regional Needs Assessment* published in October 2005 by the HECB.

## Workforce Supply by Educational Level

Workforce supply is a measure of the number of prepared workers available to take positions in the workforce. Because not all graduates enter the labor force immediately, the workforce supply is less than the annual number of certificates and degrees produced in a given field.

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<sup>1</sup> (2004) Washington State Employers’ Workforce Training Needs and Practices, Workforce Training and Education Coordinating Board.

<sup>2</sup> Over the past several years Washington has experienced a net inflow of workers. Workers migrating to the state tend to have, on average, higher levels of educational attainment and often are recruited to work in specialized technical areas the analysis does not consider the supply of workers that migrate into Washington from other states and nations.

<sup>3</sup> Employer preferences are distinguished from employer needs. The analysis included in this report is an attempt to use Bureau of Labor Statistics and Census data to measure the education and training needs for particular occupations, these measures do not fully consider employer preferences in hiring decisions.

Graduates who do not enter the workforce and those who enroll in further post-secondary education are excluded from the estimate of workforce supply<sup>4</sup>.

At the sub-baccalaureate level, the analysis focuses on education and training that is more than one year in length, but less than four-years of postsecondary education and training<sup>5</sup>. The supply at this level, termed “Mid-level Preparation,” consists of community and technical colleges, apprenticeships, and private career schools. In each case, only students who complete more than one year of education or training prior to leaving their program are included in the count of supply. Students who already had completed education at this level or above are not counted as part of the new supply at this level. The supply of community and technical college students includes both workforce education students and academic transfer students who fail to transfer to a four-year institution.<sup>6</sup> The Mid-Level preparation number does not include students who stop-out of a 4-year college or university with one year of study or more, but less than a bachelor’s degree. Eighty-four percent of the mid-level completers are estimated to enter the workforce.

### **2002-03 Mid-Level Preparation Supply of Newly Prepared Workers**

Source	Number of Newly Prepared Workers
Community and Technical College Workforce Education	10,022
Community College Academic	8,735
Private Career Schools	4,690
Apprenticeship	1,759
<b>Total</b>	<b>25,206</b>

At the bachelor’s level 81 percent of baccalaureate graduates are included in the baccalaureate workforce supply estimate. At the graduate and professional levels the number of graduate degree recipients is reduced based on labor force participation rates by degree type. On average, 87 percent of graduate degree recipients are estimated to enter the workforce. At the bachelor’s and graduate level, the supply of workers does include graduates of Washington institutions who are not residents of Washington, including international students. International students account for 3.1 percent of bachelor’s degrees awarded in Washington and 9.3 percent of graduate degrees (see Figure 1). International students are excluded from the sub-baccalaureate analysis.

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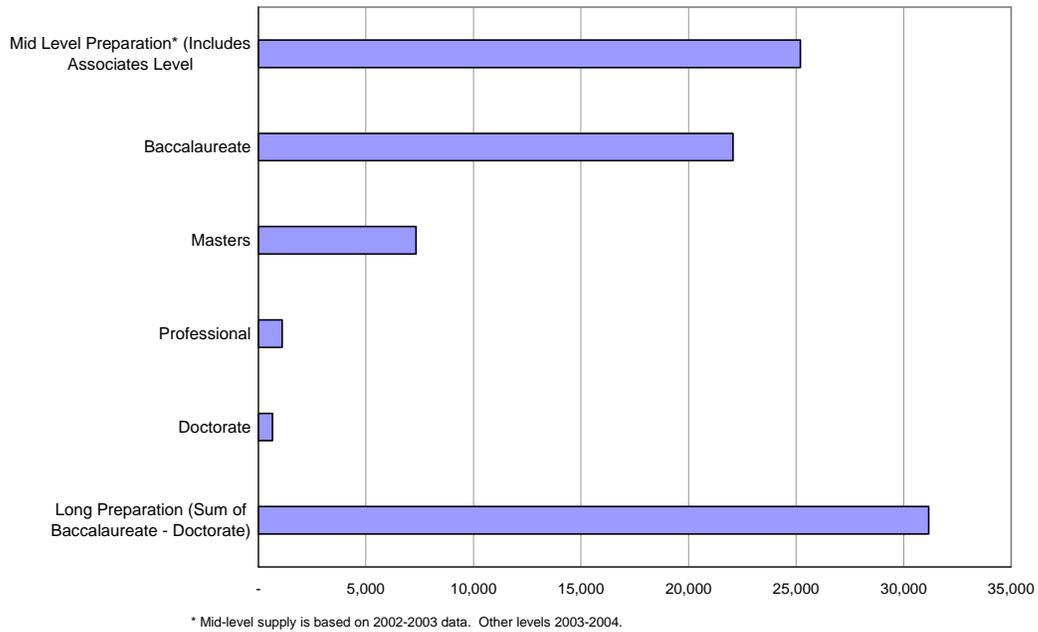
<sup>4</sup> The analysis also takes into account that some individuals hold more than one job. As is the practice of the Bureau of Labor Statistics, the analysis uses a 90 percent rule; it is assumed that for every 90 employees there are 100 different jobs that are held.

<sup>5</sup> In order to correspond with Bureau of Statistics categories discussed later.

<sup>6</sup> Annually 15,000 students transfer Washington community or technical colleges to a university program within.

**Figure 1**

**Workforce Supply**  
**Annual Supply of Newly Prepared Workers by Education Level\***

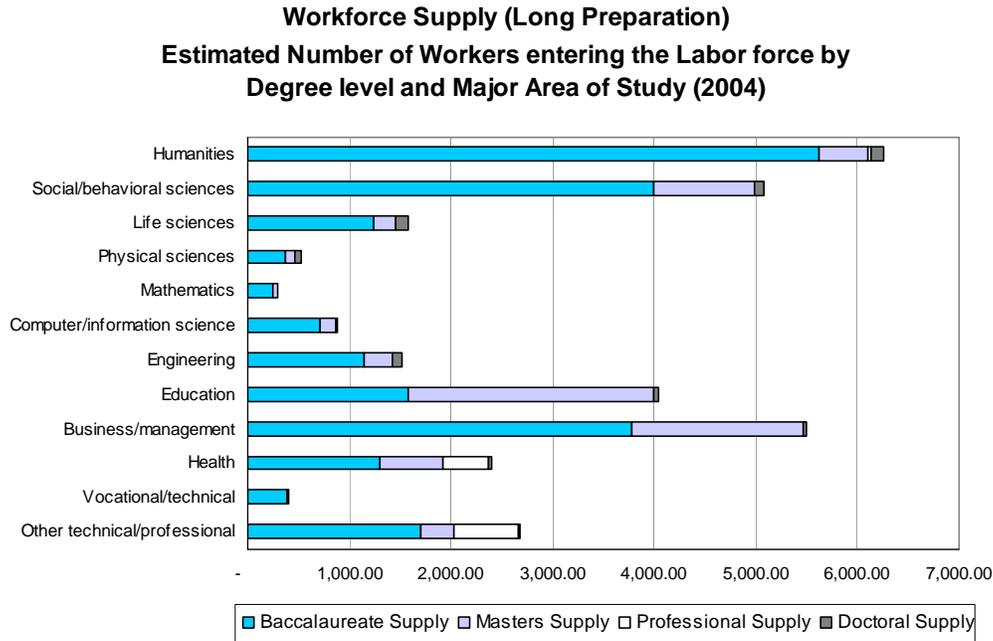


At the bachelor's level and higher, Workforce supply estimates are summarized by major field of study and degree level in Figure 2. The figure shows that professional degrees are concentrated in health fields and law<sup>7</sup>. The majority of master's degrees (56 percent) are produced in education and business.

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<sup>7</sup> Law degrees are reported in the "other technical professional" category, all of the professional degrees in this category are law degrees.

Figure 2



## Employer Demand by Education Level

Employer demand is defined as the annual number of net job openings by occupation. Two measures of demand are reported. Entry level demand is based on the standard Bureau of Labor Statistics (BLS) preparation levels assigned to all occupations. Ultimate demand (UD) is based on an analysis of the preparation levels of the existing workforce (based on 2000 census data). Underpinning both measures is the projection of future job openings provided by the Employment Security Department.<sup>8</sup> The openings include jobs created by economic growth and jobs open in order to replace workers who switch occupations, retire, or otherwise leave the workforce.

The Bureau of Labor Statistics surveys and interviews employers and analyzes occupational data in order to classify the level of education and training which represents the predominant level of training of new workers entering the occupation.<sup>9</sup> The UD approach assumes the BLS level is the minimum preparation level for entry to an occupation and census data is used to assess the degree to which workers in a given occupation hold a degree at a level higher than the minimum. To simplify the discussion, this will be referred to as additional training. However, it is important to note that for many occupations there is not a neat progression or sequence to training. In fact, there are several training pathways for entry into occupations, and/or varying incentives and pathways to receive additional training once employed in the occupation. The analysis can identify a range of training needs for an occupation, but it cannot distinguish

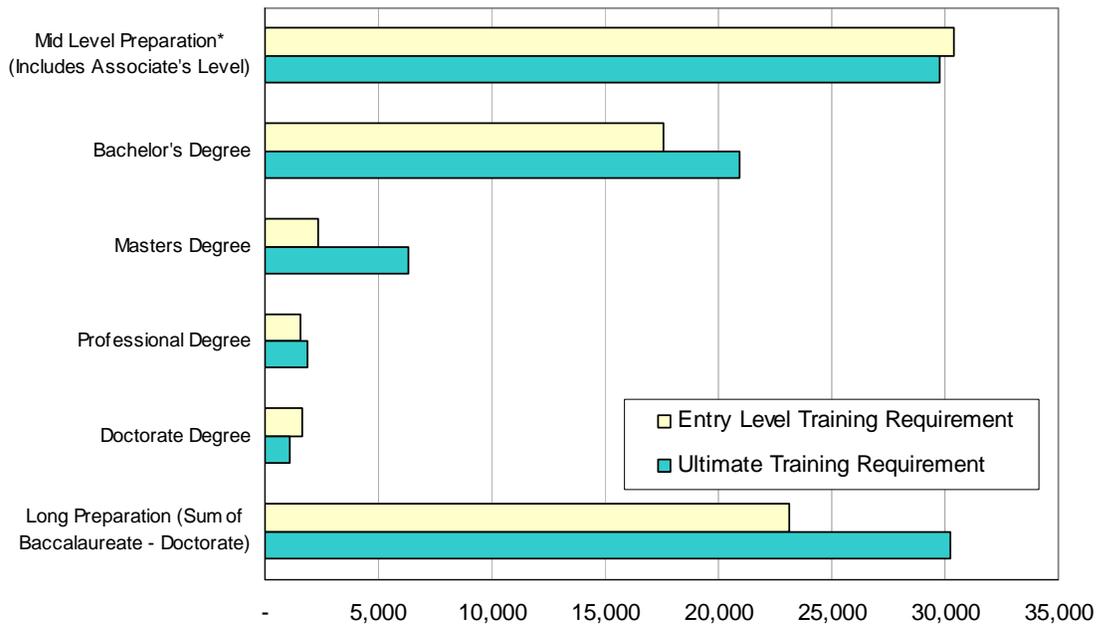
<sup>8</sup> Employment Security reports the number of job openings based upon national and state economic models of future employment by industry and surveys of employers that identify the mix of occupations in each industry.

<sup>9</sup> BLS classifies occupations into 11 training levels, some of which do not require higher education and therefore are outside the scope of this assessment.

between training before entry and training received while working in the profession. An additional complexity is that in some instances additional training may move a worker from one occupation to another, especially in occupations requiring less training. In some occupations a significant number of workers have educational levels higher than what is typically required for the job. The UD analysis accounts for this by assuming a ceiling for the preparation level of those occupations requiring less than mid-level preparation (see the 2005 State and Regional Needs Assessment for a more detailed discussion).

Figure 3

**Annual Job Openings by Preparation Level: 2007-2012**



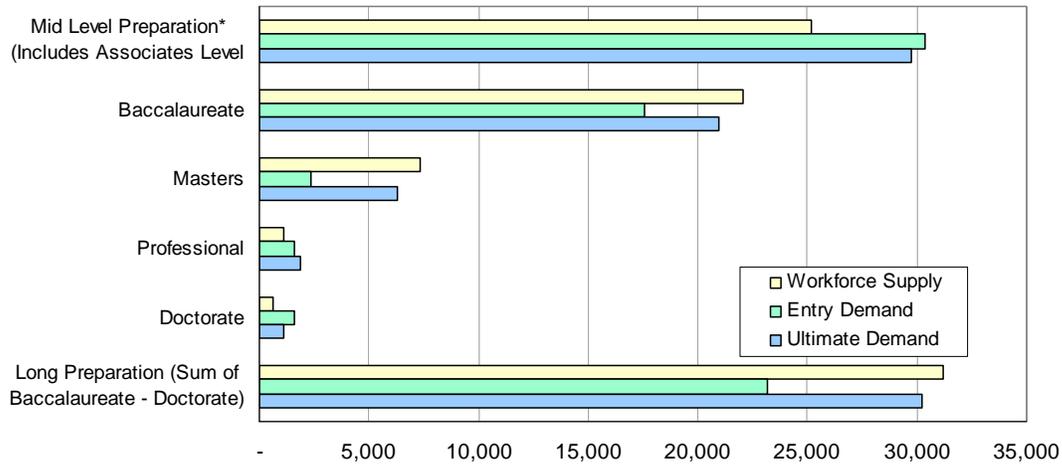
\* Mid-level supply is based on 2002-2003 data. Other levels 2003-2004.

**Mid-level Preparation Supply and Demand**

At the sub baccalaureate level, as shown in Figure 4, the supply of newly prepared workers with mid-level preparation falls substantially short of employer demand. In 2002-03, the most recent year for which data is available, there was a supply of 25, 206 newly prepared workers coming out of community and technical colleges, private career schools, and apprenticeships. Employers, however, will have an average of 30,391 annual job openings at this level of education and training between 2007 and 2012. Thus, supply is only 83% percent of demand. Even if Mid-level Preparation grows at the same rate as the age-specific population (in other words, current participation rates are maintained) supply will still fall short of employer demand. If the state is to increase the supply of newly prepared workers with Mid-level preparation sufficient to meet employer demand it will take more than relying upon demographic growth in the student population; it will take policy changes to increase sufficiently this sub-baccalaureate capacity.

Figure 4

**Annual Supply and Demand for Prepared Workers  
by Education Level\***



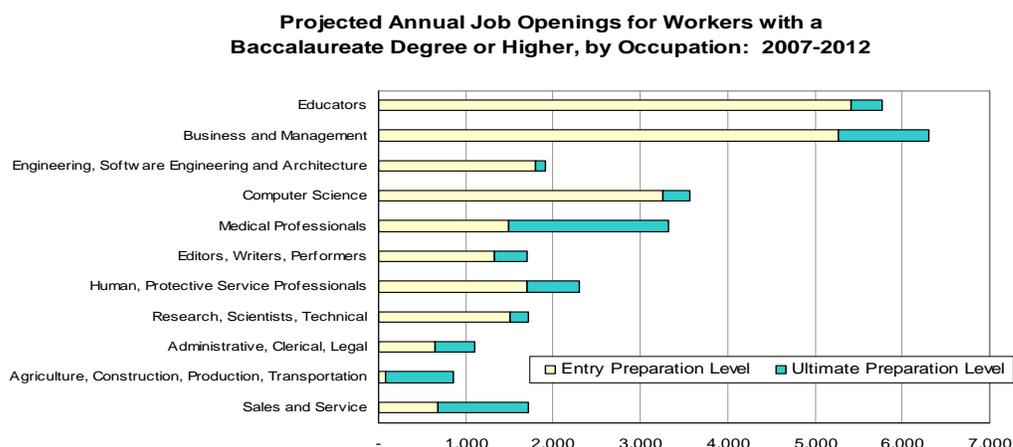
\* Mid-level supply is based on 2002-2003 data. Other levels 2003-2004. Demand is based on the projected annual average number of job openings 2007-2012

**Long Preparation Demand**

Figure 5 shows the number of workers requiring at least a bachelor’s degree for entry to occupations and as an ultimate preparation requirement. A number of occupations have substantial additional training requirements as measured by the gap between entry requirement and ultimate preparation requirement. In many cases, workers will enter the occupation with the higher level of preparation; in other cases, the workers will need to seek additional education. For example, within the medical professionals category the majority of new registered nurses are initially trained at the associates level and therefore do not appear in the “entry demand” portion of the bar on figure 5, however, the majority of practicing nurses hold a bachelor’s degree or higher and additional training needs of nurses account for 47 percent of the ultimate demand portion of the medical professionals bar.

Also evident is a high proportion of openings in agriculture, construction, production, transportation, and sales and service occupations requiring higher levels of preparation. While these are dispersed across a variety of industries and occupations, most of the positions that require higher levels of preparation are supervisory and/or highly technical (e.g., pilots, air-traffic controllers, insurance, securities, commodities, and financial services sales agents).

Figure 5



### Long Preparation Supply and Demand Match

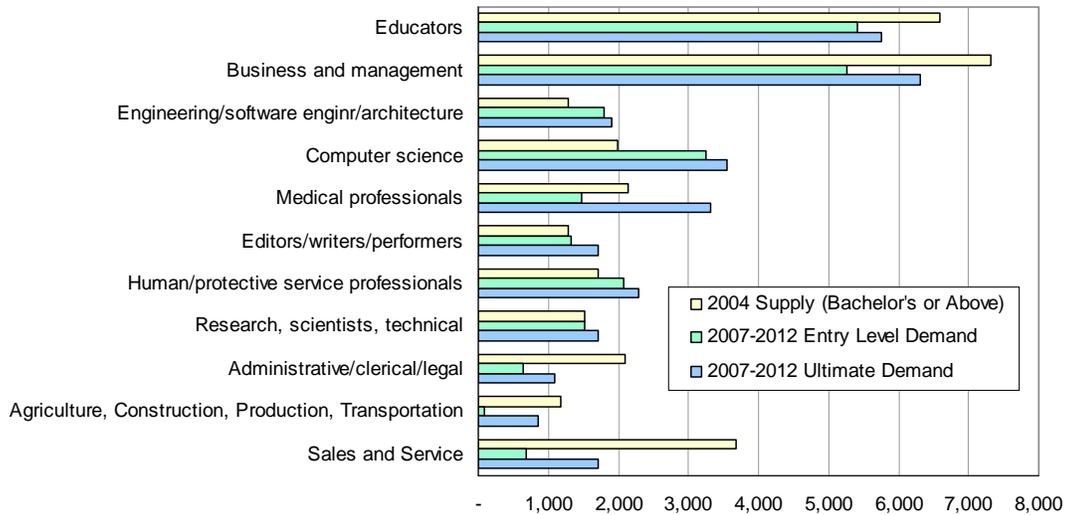
The aggregate estimate of supply and demand for education and training at the Baccalaureate level and above, as shown in figure 4, masks gaps in the number of prepared workers and projected employer needs in a number of occupational areas.<sup>10</sup> The analysis of supply and demand at the baccalaureate level and higher, therefore, focuses on those occupational areas that show the greatest need for additional graduates at the baccalaureate level or higher.<sup>11</sup>

<sup>10</sup> See the 2005 State and Regional Needs Assessment, published by the Higher Education Coordinating Board, for a fuller discussion of concerns related to the aggregate match.

<sup>11</sup> While fields of study for each workforce associate degree and for some professionally related bachelor's majors such as nursing and engineering can generally be linked with specific occupations, the relationship between academic field and occupation for other bachelor's degrees is less transparent and needs some explanation. Although graduates from the same academic field tend to gravitate toward one or two occupational areas, in most academic fields a substantial portion of graduates are distributed across a broad range of occupations. For this reason, it would be unwise to make 1:1 assessments of supply and demand based on academic field of study and occupation.

Figure 6

**Long Preparation Supply and Demand by Occupation**  
**2004 Supply of Workers with BA or higher, and Employer Demand**



As figure 6 shows, demand for workers trained at the baccalaureate level and higher in certain occupations is not met by current supply. Matching with the ultimate demand measure, current degree production meets only 67 percent of the need in engineering and 56 percent of the need in computer science. Current degree production is sufficient to meet only 65 percent of the need for additional prepared workers in the medical professions, 75 percent of the need in editing, writing and performing occupations, 75 percent of the need in human and protective service occupations, and 89 percent of the need in research, scientific, and technical occupations. Demand for degrees is being met (or exceeded) in administrative, clerical, and legal occupations, agriculture, construction, production, and transportation occupations, and sales and service occupations.

Demand in engineering, software engineering and architecture would best be met through increased enrollments in engineering. Demand in computer science would best be met through increased enrollments in computer and information systems. Close to half of the need in medical professions is due to training needs for nurses, so increases in nursing programs would be recommended, as would increases in other health related programs.

Positions in editing, writing, and performing are most commonly met by graduates of Humanities programs, however, growth in these occupations is not expected to outpace continued growth of humanities programs resulting from overall system growth. Growth in human and protective service occupations rely most heavily on graduates of social science programs. Social Science programs have not grown substantially in the number of graduates over the past three years and growth in specific majors may be warranted to meet employer needs, especially in social work and protective service professions. Finally, preparation for the research and science occupations is generally met through programs in life sciences, physical sciences, and social sciences. The gap in research and science occupations may be exacerbated over time by flat growth in baccalaureate degrees in life sciences and social sciences and declines in graduate degrees in math, physical science, health, and engineering.

While the aggregate estimates of supply and demand for educators indicate that need is being met, the 2004 Report on Educator Supply and Demand in Washington State<sup>12</sup> released by the Office of the Superintendent of Public Instruction indicates considerable shortage in special education and in a range of administrative/support positions, including speech pathology, occupational and physical therapy, and school psychology. There is “some shortage” indicated in 21 of 36 teaching areas and most administrative areas.

## Conclusion

This analysis relies on our best estimate of the preparation needs of workers required to meet the labor needs of Washington employers. The assessment finds that the higher education system in Washington is not graduating enough students with the skills required to meet employer needs for prepared workers.

The state’s supply of workers who have completed mid-level preparation—more than one year but less than four years of postsecondary training or education—meets only 83 percent of employer demand expected during 2007-2012. Increasing the supply of workers with mid-level preparation at the rate of population growth will not be sufficient to close the gap and meet employer demand. It will take policy changes to increase sufficiently this sub-baccalaureate capacity.

There is a significant mismatch between supply and demand of workers prepared for occupations requiring long preparation (those positions requiring preparation at the baccalaureate level and above). Washington does not produce enough graduates at the baccalaureate level and above to meet demand for workers prepared in a number of fields, most notably computer science, engineering, and health care. In addition, the higher education system will need to grow and continue to expand in a range of academic and professional fields to meet specific occupational needs and expand graduate programs to increase the numbers of professional and doctorate degrees produced annually.

In addition, it is important to note that occupational areas may have unique preparation needs in a range of education levels. For example, a recent report from the health care personnel shortage task force indicates high levels of need and difficulty hiring qualified workers in a wide range of health care occupations at all educational levels.<sup>13</sup> Nursing education is in high demand at the entry level (predominately provided at the associate degree level, but also substantial numbers of new nurses receive initial preparation at the baccalaureate level) but there is also need for students to continue on for master’s and doctorate degrees in nursing to train the next generation of nurses.

Continued growth and development of the higher education system in Washington is critical to the continuing economic prosperity of the state and its residents. Employers have become increasingly selective and are choosing to hire those workers who present a mix of deep technical knowledge in a given area and a set of more general or transferable skills in the areas of management, communication, and team-work. The preparation of workers with these skills and abilities relies on a strong public education system that can provide increasing numbers of students with learning opportunities of the appropriate depth and breadth to effectively compete in the labor force.

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<sup>12</sup> 2004 Report on Educator Supply and Demand in Washington State” released by the Office of the Superintendent of Public Instruction. ([www.k12.wa.us/certification/pubdocs/supplydemand2004.pdf](http://www.k12.wa.us/certification/pubdocs/supplydemand2004.pdf))

<sup>13</sup> Progress 2004: A Report of the Health Care Personnel Shortage Task Force. Workforce Training and Education Coordinating Board (<http://www.wtb.wa.gov/HCRPT05.PDF>).