

Findings of the Economic Needs Assessment Work Group

Submitted to the Higher Education Coordinating Board

Olympia, Washington

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October 28, 2008

Ms. Ann Daley
Executive Director
Higher Education Coordinating Board
Olympia, Washington

Dear Ms. Daley:

On behalf of the Economic Needs Assessment Work Group, we are forwarding this report on issues of extreme importance to the future of Washington's economy, its citizens and our system of higher education. In July, you asked us to convene a work group and take on an important set of tasks, and you asked us to work quickly and report back soon. Specifically, the work group was asked to:

- Make clear why meeting the skill requirements for a world-class innovative economy is important to our state's future.
- Advise the HECB on a methodology for analyzing the economic need to increase degree and certificate production in the state. Based on this methodology, attempt to validate or modify degree production targets stated in the *2008 Strategic Master Plan for Higher Education*.
- Identify high demand occupations and skills, and near-term strategies for increasing the supply of skilled workers.
- Identify strategies for improving analysis of skill gaps, update this information, and document system outputs and progress to close skill gaps.
- Make policy recommendations for meeting employer demand for skilled workers.

Thanks to the hard work of the diverse and thoughtful group of committed experts who served on the work group, these tasks have been accomplished, and the results are found in this report.

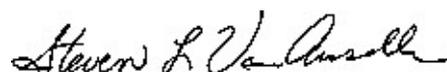
It has been a pleasure to participate in this effort. Along the way, we have learned much about Washington's economy and attendant labor market, but we have also increased our appreciation for the critical importance these issues have for our state. We now understand better that the path that has led our state to economic vitality is not the path we can rely on to continue that success. It is critical that we move toward a "grow your own" strategy that provides each Washingtonian with the education and training opportunities necessary to fill the jobs that will be available in the 21st Century. Our state's economic future is directly tied to our capacity to produce sufficient numbers of those skilled workers.

Thank you for the opportunity to serve on the work group.

Sincerely,



Lee Huntsman, Co-Chair
Executive Director, Life Sciences Discover Fund



Steven VanAusdle, Co-Chair
President, Walla Walla Community College

Enclosure

Summary of Findings and Recommendations

In July 2008, a special *ad-hoc* work group was convened to report to the Higher Education Coordinating Board (HECB) on the state economy's growing demand for college-educated workers and its relation to the degree production targets proposed in the *2008 Strategic Master Plan for Higher Education*. This effort was undertaken in response to legislative questions about the 2018 degree production targets contained in the Master Plan. The work group also was asked to identify the costs and risks to Washingtonians if we fail to meet employer demand for adequately trained and credentialed workers, and to identify high demand occupations and strategies for meeting employer demand in the future.

After gathering data and analysis to help answer these questions, the Economic Needs Assessment Work Group came to four major conclusions:

- While Washington's higher education institutions have been, and remain, vital contributors to our state's economic success, our economy has increasingly relied on attracting specialized talent from outside the state. Washington must instead produce a sufficient supply of its own skilled workers to meet its economic needs.
- Measuring the gap between current supply and forecasted demand for degrees and certificates is a difficult task. Given our need to make long-term forecasts, the state needs to improve its analytical capabilities in order to better forecast supply-demand gaps, especially for those occupations with the greatest potential impact on Washington's economic prosperity.
- Employer demand for 2018 is expected to be so much higher than current degree production that it warrants immediate steps to increase degree- and certificate-production capacity at all higher education levels.
- The state's investment in high-demand programs of study must be sustained and enhanced, and the pipeline of interested and prepared students must be expanded.

Securing Talent for Washington's Economic Future

Washington's economy has undergone major structural changes in the last 20 years, driven by the strengthening of the technology sectors and expanding global connections. While the state has developed a well-educated and technically skilled workforce, it has also become dependent on specialized talent.

Because of its distinctive core of strong, globally competitive industries, a thriving culture of entrepreneurial creativity and investment, extraordinary natural environment, and high quality of life, Washington has drawn some of the world's best talent to live and work here. However, the state will not be able to continue to rely on talented workers trained elsewhere. Washington faces growing international competition for talent. Other nations and U.S. states are now focused on producing, attracting, and retaining skilled workers. They understand that a skilled workforce is the key to economic innovation and a high-wage economy.

In the face of such competition, our higher education system must be expanded, so that Washington can increasingly provide its own skilled workers to drive its economic growth.

2018 Degree Production Targets

The work group sought to forecast Washington's economic need for skilled workers by education level, and then determine the number of degrees needed to satisfy that economic need.

Comparing the results of its analysis of economic need with the 2018 degree production targets of the 2008 Strategic Master Plan, the Work Group makes the following recommendations:

- ▶ Ten-year system goals should be developed based on a policy of keeping pace with degree production levels in other innovative states and on the best available economic analysis of the gap between current supply and future demand by education level.
- ▶ Degree production targets for mid-level and for graduate and professional degrees should be expanded, as proposed in the Master Plan.
- ▶ The economic analysis undertaken for the work group indicates that the HECB should consider modestly lowering the 2018 baccalaureate degree production target from 42,400 to approximately 39,000.

Looking forward 10 years, it is not possible to predict economic demand with much accuracy. Nevertheless, regardless of the method used or the precise size of the gap between current supply and future demand, the projected demand for degrees in 2018 appears to be much higher than current production. It therefore makes sense to continue increasing degree production at all three educational levels (mid-level, baccalaureate, and graduate/ professional).

Expanding Programs Supporting High Demand Occupations

Washington's higher education institutions have helped provide our state with its skilled workforce, but certain sectors of our economy face significant shortages of qualified workers. Enrollment growth should emphasize improving the student pipeline and expanding capacity in programs that support occupations in high demand. This means focusing on programs that support employment and local economic development, or contribute to the innovation capacity of the economy.

At the baccalaureate level and above, the high-demand occupations are the science, technology, engineering, and mathematics (STEM) disciplines, and health sciences. At the mid-level, they are construction, auto mechanics, transportation, installation/maintenance/repair; health care, early childhood education, accounting tech/bookkeeping, aircraft mechanics, science technology, and STEM transfer. These high-demand occupations may change based on changes in the supply and demand for workers. It is important that institutions, especially community and technical colleges, be able to identify other high-demand programs based on local employer demand and industry cluster strategies.

Although there is no gap for educators overall, gaps do exist in certain educational fields, including early childhood education at the mid-level, and math and science at the higher levels. These shortages will be compounded by the newly revised high school math requirements and the proposed changes to the high school science requirements. Because

the education pipeline is such a critical issue, it is essential that students have access to these courses. Addressing these teacher shortages must be a high priority.

With regard to high-demand occupations, the work group recommends:

- ▶ Sustaining and expanding Washington’s investment in high-demand programs and increasing the number of interested and prepared students in the pipeline (see recommendations of the HECB Policy and Demographics Work Group). This is especially important in engineering and computer science, where the pipeline is a critical constraint on degree production.
- ▶ Focusing new degree production capacity on high-demand occupations. In the near term, most of our new higher education capacity should be focused on high demand occupations.
- ▶ Expanding early childhood education and math and science teacher programs, not only to reduce shortages in these high-demand occupations, but also to prepare more students for college work in other high-demand fields.

Improving Capacity to Analyze Economic Need and Improve Program Planning

This exercise has shown the value of adding economic analysis to the HECB’s suite of planning considerations. Higher education institutions should also consider economic need when proposing whether to expand or rebalance their educational programs. State agencies and Washington’s higher education institutions have a critical need to make informed resource decisions based on an improved ability to analyze labor market information and employer demand. Improved analysis should be used to update system goals and institutional targets, and to track system results. Specifically, the work group recommends:

- ▶ Using the inter-agency “Joint Report,” A Skilled and Educated Workforce, as the structural focal point of efforts to regularly analyze employer demand, update goals and targets, and assess results.
- ▶ Augmenting the “Joint Report” process with a newly established technical advisory committee to advise on methodology and data sources, and a mechanism to consult with employers to validate analysis results.
- ▶ Developing agency plans for incorporating the analysis results into program plans and accountability systems. In addition, agencies and institutions should use the results to guide resource allocation decisions.

Concluding Observations

Washington faces an enormous challenge to provide the skilled workers that its economy requires. The consequences of failing to meet this challenge are significant. The state’s economic success has resulted in part from its ability to attract talent from beyond its borders. Talent is and will continue to be the defining characteristic of an innovative, high-wage economy. Washington must improve and expand its capacity to develop that talent, based on a strategy of educating all its citizens for the jobs it currently has and wants to keep, and the jobs it hopes to have in the future.

Introduction

The Higher Education Coordinating Board's *Strategic Master Plan for Higher Education* was approved by the Washington Legislature in spring 2008. The plan, which covers the period 2008-2018, identifies two major goals for higher education in the state:

Goal 1: *Create a high-quality higher education system that provides expanded opportunity for more Washingtonians to complete postsecondary degrees, certificates, and apprenticeships.*

Goal 2: *Create a higher education system that drives greater economic prosperity, innovation and opportunity.*

To help achieve these overarching goals, the Strategic Master Plan proposes increasing the total number of degrees and certificates produced annually to attain Global Challenge State (GCS) benchmarks.¹ The Master Plan calls for 9,400 additional degrees and certificates at the mid-level (Associate degrees and one-year certificates), 13,800 additional baccalaureate degrees, and 8,600 additional advanced degrees. Reaching the degree goals would move overall degree attainment (Associate degrees and beyond) for younger adults from its current level of 39.8 percent to 42.5 percent by 2018, and to 46.1 percent by 2025 (surpassing the current 44 percent degree attainment level for Washington's baby boomer generation).

The Legislature's resolution endorsing the Strategic Master Plan instructed the Higher Education Coordinating Board (HECB) to consider "refining and prioritizing the proposed Bachelor's degree and graduate degree targets to base them more specifically upon the evolving needs of Washington's economy, rather than upon external benchmarks."

In July 2008, Ann Daley, the HECB Executive Director, convened the Economic Needs Assessment Work Group to advise her and the HECB on responding to the Legislature's request. Director Daley later broadened the scope of the work to include identifying the costs and risks to Washingtonians of failing to meet employer demand for skills and associated credentials, and identifying high demand occupations and key strategies for meeting employer demand in the future.

The Economic Needs Assessment Work Group included a range of high-level leaders representing state business and industry, labor, academia, and state and regional planning agencies. The work group met several times over a two-month period, and created sub groups to review data and publications, and to develop findings.

This report addresses the Legislature's concern and provides an alternative analysis for establishing the degree production goals. As will become clear, the additional economic analysis largely corroborates the targets developed using the GCS benchmarks.

¹ The Global Challenge States are those that, including Washington, rank highest on the New Economy Index developed by the Progressive Policy Institute. In addition to Washington, the Global Challenge States include Massachusetts, California, New Jersey, Connecticut, Colorado, Virginia, and Maryland.

While recognizing some of the limitations of the GCS benchmarks, the work group believes that their use is appropriate for setting long-range degree production targets. Our overall approach for setting degree production targets should be based on a combination of externally-benchmarked aspirational goals and the best available economic analysis of the gap between current supply and future demand by education level.

The remainder of the report is divided into five sections. In the first, the work group describes in more detail why achieving these goals is critically important to our state. Next is a review of the literature and recent reports on the demand for degrees and certificates in Washington – both in the aggregate and in specific occupations. This is followed by an analysis of the degree production targets by education level in the *Strategic Master Plan for Higher Education*, and preliminary results of new analyses of high demand occupations in Washington. The work group then looks at ways to improve assessment of employer demand and degree production capacity and suggests how best to use this data for program planning and accountability. The findings conclude with some final observations.

Why Higher Education Is Important for Washington's Economy

Washington has a long history of business success. For the better part of a century, its signature industries in forest products and aircraft manufacturing led the world.

Weyerhaeuser and the Boeing Company took full advantage of the state's abundant natural resources and generations of dedicated workers. In recent years, software and retailing innovations, as well as life-changing health science discoveries, have given Washington an allure that has drawn investment and talent from around the globe.

For more than 60 years, the early and sustained federal investment in the University of Washington Medical School has drawn private investment to the state and created a vibrant life sciences research industry. In the process, it also has established many successful biotechnology and medical device firms. Over the past three decades, inspired by visionary business leaders such as those at Microsoft, Starbucks, Nordstrom, Amazon, Immunex/Amgen, and others, Washington has created a culture of entrepreneurial creativity that has drawn some of the world's best talent and investment to Northwest enterprises. According to a 2008 study by the Technology Alliance, Washington's concentration in high-tech businesses is 35 percent above the national average, which places the state fourth in the nation in the concentration of technology-based employment.²

But even as its past successes continue to benefit citizens, Washington finds itself in a world changing so rapidly that its future prosperity is not secure. Against this backdrop, accepting that serious threats to Washington's economic security could emerge in the future might seem unduly pessimistic to some. However, Washington is living on the fruits of past investments and on its historic ability to attract a highly skilled workforce from other American cities and around the world.

Current Challenges

Among the most significant challenges facing Washington in recent years has been the international competition for talent. Economists around the globe agree that the pool of talent needed for the world's exploding knowledge economies is too small, and all nations are racing each other to produce, attract, and retain skilled workers.

Here in the United States, the talent challenge is compounded by our relative lack of readiness—compared to other countries—for the changes that will occur as a result of a massive shift in workforce demographics. The nation's most educated generation is beginning to retire, with the first baby boomers reaching eligibility to collect Social Security this year. In Washington, these are the most highly educated workers. In little more than a decade, many of them will be gone from the workforce, replaced by younger adults who have

² The Technology Alliance, *State of Change: The Economic Impact of Technology-Based Industries in Washington State*, June 2008 (ii).

on average *less* education than their parents. In most other countries, the reverse is true: young adults are more educated than their elders, and the long-term trend shows a steady increase in the overall level of education of each new generation.³ Not here.

Although Washington's degree attainment rate is higher than many other U.S. states, it lags behind our international competition. Currently, 42 percent of Washingtonians aged 25-64 hold an Associate degree or higher. To equal the best-performing countries in the world (Canada, Japan, Korea), this percentage would need to rise to about 55 percent.⁴

The situation is particularly acute in those specialized areas of technical training and skill most sought after in the innovation economy—science, technology, engineering, and mathematics—commonly referred to as the STEM disciplines. Competitiveness indicators collected by the National Research Council show that 38 percent of all South Korean undergraduates earn baccalaureate degrees in the natural sciences or engineering. France's figure is 47 percent, China's 50 percent, and Singapore's 67 percent. On the other hand, in the United States only 15 percent of undergraduates earn such degrees. The competitive picture among doctoral students in the United States is equally startling. Foreign nationals earn a sizable percentage (34 percent) of all U.S. doctoral degrees in the natural sciences, and more than half (56 percent) of all engineering Ph.Ds.⁵

The dramatic differences can be seen again in international statistics related to the production of engineering degrees. According to the American Electronics Association (AeA), China graduates four times as many engineers as the United States. Though Japan has less than half the population of the U.S., it graduates almost twice as many engineers. South Korea has only one-sixth the population of the U.S., and only five percent of the U.S.'s gross domestic product, yet it annually graduates almost as many engineers.⁶

Already, this global disproportion in knowledge and training has had marked effects on Washington business. Employers increasingly have sought foreign nationals to fill skilled positions, since there is an insufficient number of skilled Washingtonians available for their high-tech businesses. At the same time, increasingly stringent immigration rules have reduced access to this international supply of talent, increasing the pressure on businesses that are able to do so to move or expand their operations off-shore. A recent example of this

³ Higher Education Coordinating Board, *Moving the Blue Arrow: 2008 Strategic Master Plan for Higher Education in Washington*, December 2007 (1).

⁴ National Center for Higher Education Management Systems analysis presented at an HECB-sponsored public meeting in Renton, Washington on September 30, 2008, conducted as part of the NCHEMS/WICHE *Escalating Engagement* project.

⁵ National Academy of Sciences, *Rising above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*, see <http://www.nap.edu/catalog/11463.html>, 2007 (16).

⁶ Terry Byington, *Technical Workforce 2020: How Do We Get There?*, (slide 6) from National Science Foundation data.

is the creation of new Microsoft research and development offices in Boston and Vancouver, British Columbia.⁷

But as the global competition for science, math, and engineering skills intensifies, other, less well-appreciated problems in the labor supply are also growing. Workers who require technical training, but at a level below a Bachelor's or advanced graduate degree, are becoming increasingly scarce. What the Council on Competitiveness calls "middle skills"—those used by employees such as maintenance workers, auto mechanics, welders or electric power workers — are in increasingly short supply. Such skills are needed to keep the machinery of the economy running.

For the U.S. as a whole, the Bureau of Labor Statistics forecasts that 24 percent of all job openings between now and 2016 will be at the mid-level and 22 percent at the baccalaureate level or higher.⁸ Projections of new jobs paint a similar picture. Though high skilled jobs are expected to grow at a rate of 7.8 percent through 2016, middle-skilled jobs are expected to grow even faster, at a rate of up to 12.7 percent.⁹ According to the Council on Competitiveness, America's scarcest sustainable resource may well turn out to be its energy workforce.¹⁰

In Washington, the Employment Security Department is forecasting that 45 percent of total job openings between now and 2016 will require a postsecondary degree or certificate, or long-term on-the-job training. Similar to the national forecast, 23 percent of all job openings will require a mid-level credential and 22 percent will require a baccalaureate degree or above.¹¹

Whether highly-skilled or middle-skilled, Washington's workers will need new flexibility and nimbleness to keep the state's economy competitive. Indeed, adaptability maybe the most important skill upon which future prosperity will depend. Our economy is highly dynamic. It creates new jobs—and sheds those that are obsolete—at a very rapid rate. The U.S. Department of Labor expects this trend to continue for decades to come. A typical 18-year-old today will have more than 10 different jobs before he or she is 38.¹² Therefore, training that adequately prepares Washington students for the future—however sophisticated and cutting-edge—must also include the skills to invent, adapt, and re-imagine.

⁷ For a business press article on how Microsoft is using the new Microsoft Canada Development Centre in Vancouver, BC as a work-station for its U.S. foreign workers with visa problems, see <http://www.bizjournals.com/seattle/stories/2008/04/07/story5.html>.

⁸ U.S. Bureau of Labor Statistics, *Monthly Labor Review*, November, 2007 (103). Downloaded at <http://www.bls.gov/opub/mlr/2007/11/art5full.pdf>

⁹ The Council on Competitiveness, cited in *Thrive: The Skills Imperative*, 2008 (13).

¹⁰ Council on Competitiveness, *Thrive, the Skills Imperative* (28).

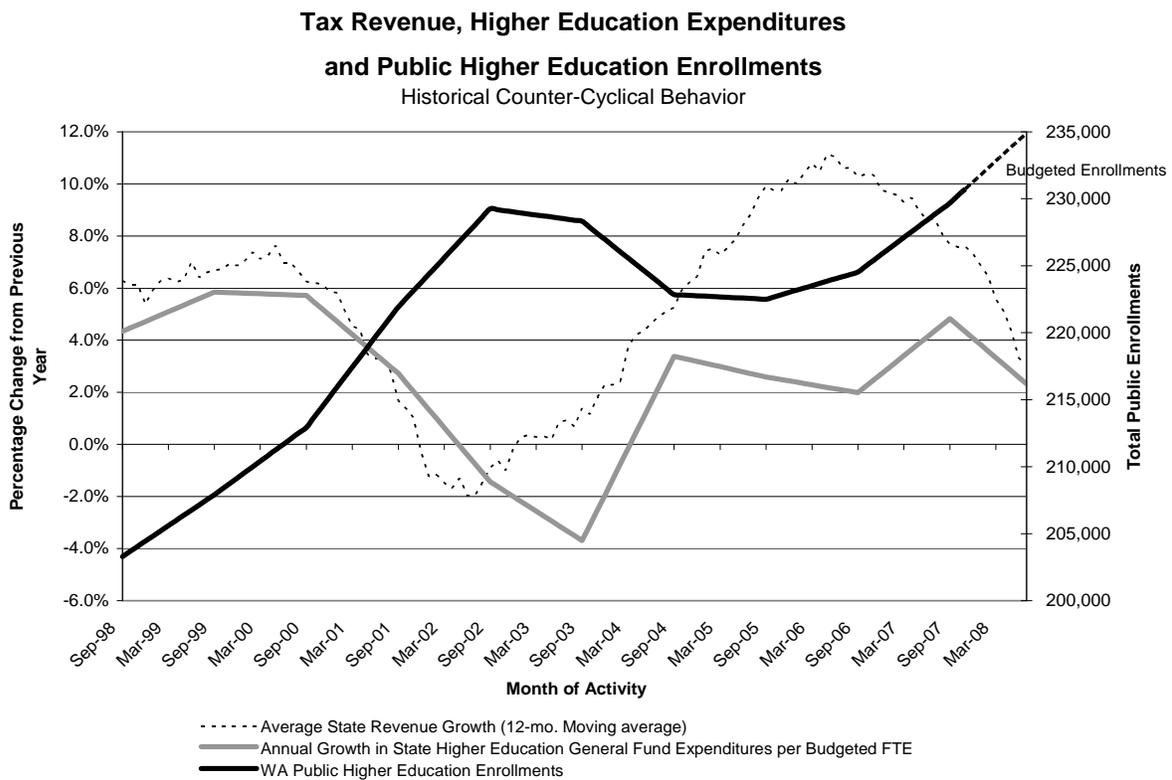
¹¹ Washington Employment Security Department, *Employment Projections, Methodology, and Results*, Table 3, Page 12. June 2008.

¹² U.S. Department of Labor *Number of Jobs Held, Labor Market Activity, and Earnings Growth among Younger Baby Boomers: Recent Results from a Longitudinal Survey*, Summary, 2004.

Another demographic trend affecting the supply of skilled workers in Washington is the steady growth in the low-income population. Within the next five years, it is estimated that almost half of the state's graduating seniors will be from families with annual incomes of \$50,000 or less.¹³ With additional investment we can enable students from economically challenged backgrounds to move into math and science programs of study, to earn certifications in high-demand fields, or go on to baccalaureate degrees and beyond in disciplines that will prepare them to lead and support the innovation economy.

Finally, higher education faces a challenge confronting other policy areas such as public assistance and health care. Declining state revenues and economic forecasts that predict continued fiscal difficulty in the immediate future make strategic investment decisions more difficult. Worse, higher education demand is counter-cyclical—enrollments increase as the economy slows. During an economic downturn, workers go to college. But the economic downturn results in lower tax revenues, and state government has less money to support higher education when it is most needed. Hence we have seen state higher education expenditure levels fall at the precise time that enrollments are increasing. The chart below shows how the pattern has worked historically in Washington, with the black line indicating the enrollment trend and the solid grey line showing state higher education expenditures. The chart shows expenditures heading down as enrollment moves up.

Figure 1



Source: Higher Education Coordinating Board analysis from Legislative Evaluation and Accountability Program Committee data.

¹³ HECB, *Moving the Blue Arrow* (7).

The recent economic turmoil that has led to declining state revenues and instability in national and international financial markets could cause some to regard substantial additional investments in Washington's higher education system as fanciful, if not impossible. The difficulty of the choice to expand higher education in a time of economic hardship for the state should not obscure the benefits of such a choice. With careful budget planning, the state can continue to build its higher education system, strengthening its current competitiveness and readying it to compete more successfully in the future. Doing so will enhance our citizens' earning power and allow us to come out of the downturn faster. It will enable Washington firms to innovate and remain globally competitive.

Review of Recent Reports and Research Findings

This section summarizes recent research findings and reports that help frame our understanding of economic needs in Washington. Many private organizations and public agencies have looked at the issue of economic demand for skilled workers and our current capacity to produce them. The work group endeavored to compile some of that information.

The first part of this section examines demand for postsecondary degrees and certificates at the aggregate level. The second part looks at what we know about demand for specific occupations and skills – so called “high-demand occupations.”

College Degrees and Economic Vitality

In its 2006 white paper, “Educating Washington Citizens for High-Demand Jobs,” the Prosperity Partnership makes a connection between college degrees and economic vitality:

A fundamental condition for creating jobs . . . is the provision of college education to as many of our residents as possible, with an emphasis on the fields that are driving our regional and state economies. Washington must produce more engineers, computer specialists, scientists, and high-technology thinkers if we are going to maintain and expand our leadership position in the new global economy.¹⁴

A recent report of the Technology Alliance provides considerable evidence that these high-demand jobs have a profound impact on the state’s economic health. In 2007, for example, technology-based industries in Washington employed more than 340,000 people. With the multiplier effects that such jobs create, the tech industry accounted 1.16 million jobs, or 40 percent of total covered employment in Washington.¹⁵

Though only 15th in size of population when compared with other states, Washington ranks 9th in its concentration of industrial and federally-funded research and development dollars received.¹⁶ A further indication of the importance of tech-based industries to the state is that they generated an estimated \$5.7 billion in business, sales, and use taxes for state and local government in 2003.¹⁷

Nevertheless, according to a study by the National Science Foundation, Washington ranks only 36th among all states in the number of Bachelor’s degrees it awards per capita.¹⁸ In sheer numbers, then, it must expand its production of degrees and certificates. Only with an adequate supply of skilled workers can Washington’s businesses grow and thrive. Providing such a supply effectively, however, will require careful assessment of present and future

¹⁴ Prosperity Partnership, *Educating Washington Citizens for High-Demand Jobs*, October 30, 2006, p. 1.

¹⁵ William B. Beyers, *The Economic Impact of Technology-Based Industries in Washington State*, a report of the Technology Alliance, June 2008, p. i. Multiplier effects refer to the indirect employment that results from an industry’s forward and backward linkages to other industries, and the savings and consumption spending of the industry’s workers.

¹⁶ Beyers, *Economic Impact*, p. ii.

¹⁷ Beyers, *Economic Impact*, pp. 35-36.

¹⁸ Cited in Prosperity Partnership, *Educating Washington Citizens*, p. 4.

workforce needs, and a nuanced understanding of how higher education and the economy intersect.

Economic Benefits of a Better Skilled and Educated Workforce

The economic benefits of building a more competitive workforce for Washington business are tangible: job creation, a more robust tax base, a stronger export base, new investment in Washington from out of state and abroad, higher earnings, and the vibrant secondary economic effects that flow from all of these.

Thriving businesses that need a workforce with certificates and Associate degrees or higher pay more for those credentials, and higher wages raise consumption spending in the economy. The evidence is definitive that college graduates earn more. In 2006, median earnings of U.S. workers age 25 and over with an Associate degree were 28 percent higher than the median earnings of high school graduates, and workers with a baccalaureate degree or higher earned 80 percent more than high school graduates.¹⁹ The Prosperity Partnership shows that wage-earning benefits also extend widely: increases in the number of those with baccalaureate degrees in the economy increase the earnings of all workers, not just the degree holders.²⁰

The earnings differential enjoyed by workers who take high-demand jobs in technology-based industries in Washington is substantial. In 2007, workers in these industries earned an average of almost \$118,000. This was 117 percent above the state average of \$54,000.²¹

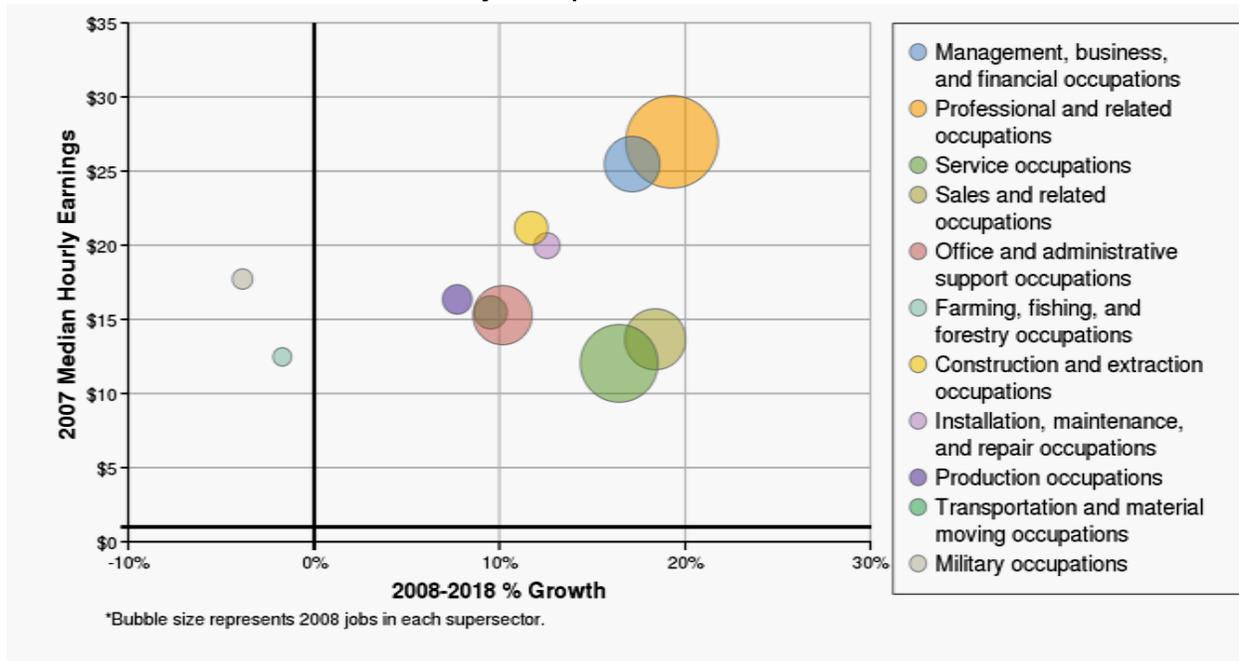
Broader forecasts of industry growth and accompanying wage growth in Washington tell the same story. As can be seen in the following chart, the clusters with the highest growth rates and wage levels—business/financial and professional occupations—are projected to exceed the overall projected employment growth rate of 15 percent between now and 2018. Further, they are expected to pay substantially more than the state’s median wage last year of \$18.72. This projected growth has not happened yet and may not occur. Growth in these clusters can only be realized if there is an adequate supply of skilled workers, but one of the benefits of training Washington workers with those skills is that earnings will rise.

¹⁹ U.S. Census, *Current Population Survey*, see http://pubdb3.census.gov/macro/032007/perinc/new03_010.htm.

²⁰ Prosperity Partnership, *Educating Washington Citizens*, p. 15.

²¹ Beyer, *Economic Impact*, p. i.

Figure 2
 Washington State Forecast Employment Growth and Median Hourly Earnings
 by Occupational Cluster



Source: Economic Modeling Specialists, Inc. (Moscow, Idaho), based on Washington Employment Security data and other sources.

The increase in education levels triggered by the need for a more skilled workforce also has indirect effects that enrich a competitive economy. The Prosperity Partnership has outlined some of these added benefits. Decreased unemployment leads to decreases in the need for public assistance. Higher levels of education and skills also correlate with decreased crime and greater civic participation.²²

Better aligning the goals of the state's higher education system, therefore, to employer need for a skilled and expert workforce will produce multi-faceted benefits. It will improve output, increase productivity, and enhance quality. It will prepare the workers to staff and lead businesses that can compete successfully in a global economy. And it will promote shared prosperity for all the state's citizens.

Employer Difficulty Finding Skilled Workers

The Workforce Training and Education Coordinating Board releases results from its employer survey every two years. The results have consistently shown that Washington employers are having difficulty finding skilled workers at all education levels beyond high school. The statewide survey asks if the firm or organization had difficulty in the last 12 months finding qualified applicants at various education levels.

As one might expect, given the overall distribution of jobs in the economy, when looking at the number of firms hiring at each level, there are more jobs and more job openings (in part

²² Prosperity Partnership, *Educating Washington Citizens*, p. 16.

due to higher turnover rates) at the lower and mid-education levels. Fewer employers indicated they had attempted to hire workers at the baccalaureate level or higher than at lower education levels in the previous 12 months. Figure 3 below shows the percentage of firms that had attempted to hire workers at the indicated education level that indicated they had difficulty finding qualified workers. A total of 2,100 firms responded to the survey.²³

Figure 3
**Employer Survey Data on Difficulty Finding Skilled Workers
 by Education Level — Washington State, 2007**

Education Level	Estimated number of WA employers hiring at this level in the previous 12 months	Percentage of survey respondents hiring at this level indicating difficulty finding skilled applicants
No High School Diploma	26,003	18%
High School/GED	46,677	33%
Some College (No Degree or Certificate)	27,833	68%
Mid-Level (Voc. Cert. or AA Degree)	59,088	81%
Baccalaureate	16,660	83%
Graduate/Professional	14,061	89%

Note: Industries that hire at a specific education level may have been over- or under-sampled or have different response rates.

Source: HECB analysis from WTECB employer survey summary tables.

The survey found that since more employers hire at the mid-level than at any other level, more employers reported difficulty finding skilled applicants at the mid-level (than at any other level). It is clear from the data that firms that attempt to hire at the mid-level or above are experiencing a higher level of difficulty finding qualified applicants. The employer survey data support the conclusion that we have produced too few degrees at these levels to satisfy employer demand.

Difficulty Finding Specific Skills

The 2007 WTECB employer survey also provided some interesting information about the skills employers have the most difficulty finding among the available workforce. The table below shows an estimate, based on the survey results, of the percentage of all employers in the state who attempted to hire workers with a specific skill and had difficulty doing so. Not surprisingly, occupation-specific skills were highest on the list. But interestingly, several so-called soft skills came right behind, including problem-solving and critical thinking skills,

²³ Workforce Training and Education Coordinating Board. Information on the fall 2007 employer survey presented to the Board in March 2008, see <http://www.wtb.wa.gov/Documents/Tab4PDFEmployerSurvey.pdf>.

positive work habits and attitudes, communication skills, team work skills, and the ability to adapt to change. These skills were even more difficult to find for Washington employers than reading, writing, and math skills.

Figure 4
Ability of Washington Employers to Find Workers with Specific Skills
Washington State, 2007

Skills employers sought when hiring	Percentage of firms who attempted to hire (in Previous 12 Months) and had difficulty finding qualified applicants with the specific skill
Occupation-specific skills	82%
Problem solving or critical thinking skills	79%
Positive work habits and attitudes	69%
Communication skills	65%
Team work skills	64%
Ability to adapt to changes in duties and responsibilities	64%
Ability to accept supervision	56%
Math skills	48%
Writing skills	39%
Computer skills	38%
English as a second language skills	34%
Reading skills	27%

Source: March 27, 2008 Presentation to the WTECB Board on the draft results of the 2007 employer survey.

These results suggest that employers strongly value the “meta-skills”— problem solving, critical thinking, communication, team work, etc.— almost as much as occupation-specific skills.

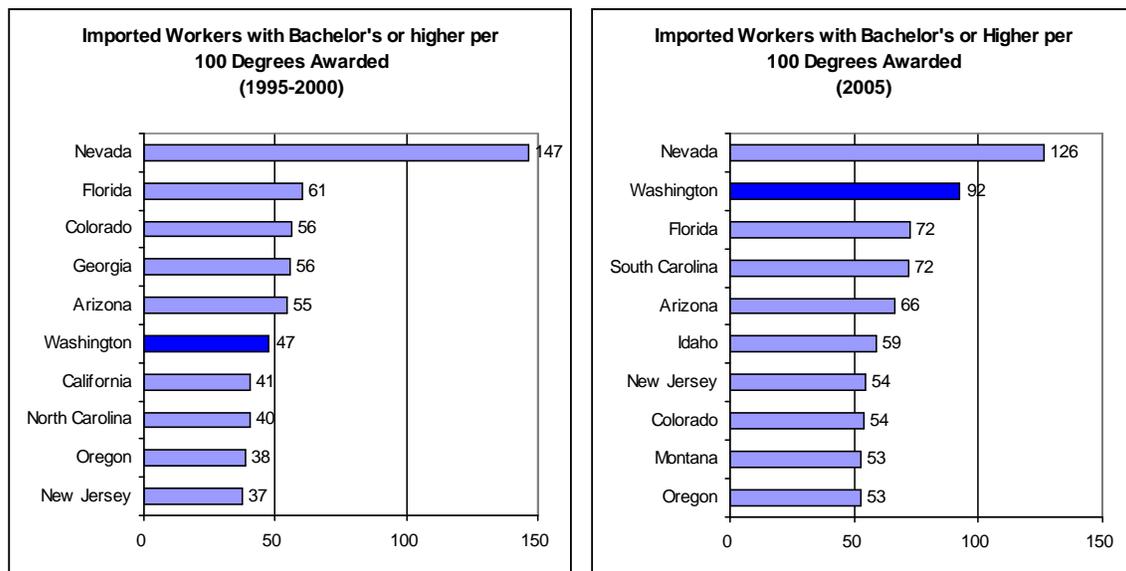
Additional survey questions asked employers about the ability of new entry-level employees to demonstrate specific skills. Highest on the list of skills new-hires were failing to demonstrate were problem-solving/decision-making skills, taking personal responsibility for learning, resolving conflict, and observing critically—all skills consistent with the list of hard-to-find “meta-skills.” These are skills that are directly addressed in associate and higher degree programs, and longer certificate programs.

In-Migration of Workers at Higher Skill Levels

Some employers who are unable to find the skilled workers they need locally look outside the state and overseas. Washington has consistently had very high rates of in-migration of workers with high skill levels, but recently the pace of this in-migration has accelerated in

comparison to the domestic supply. Figure 5 below shows that in the period 1995-2000, Washington ranked sixth among all states in the number of workers who were imported into the state and who held Bachelor's degrees or higher. By 2005, that number rose from 47 to 92 workers per 100 degrees awarded, and the state's rank had risen from sixth to second in the nation. In addition, competition to attract talent has increased. Between 1995-2000 Washington was one of 16 states that relied on imported talent, and in 2005, 34 states had a net in-migration of educated workers. These findings are consistent with the employer survey results and other signs of increasing employer difficulty finding highly skilled workers.

Figure 5
Net In-Migration of Workers with a Bachelor's Degree or Higher
1995-2000 and 2005

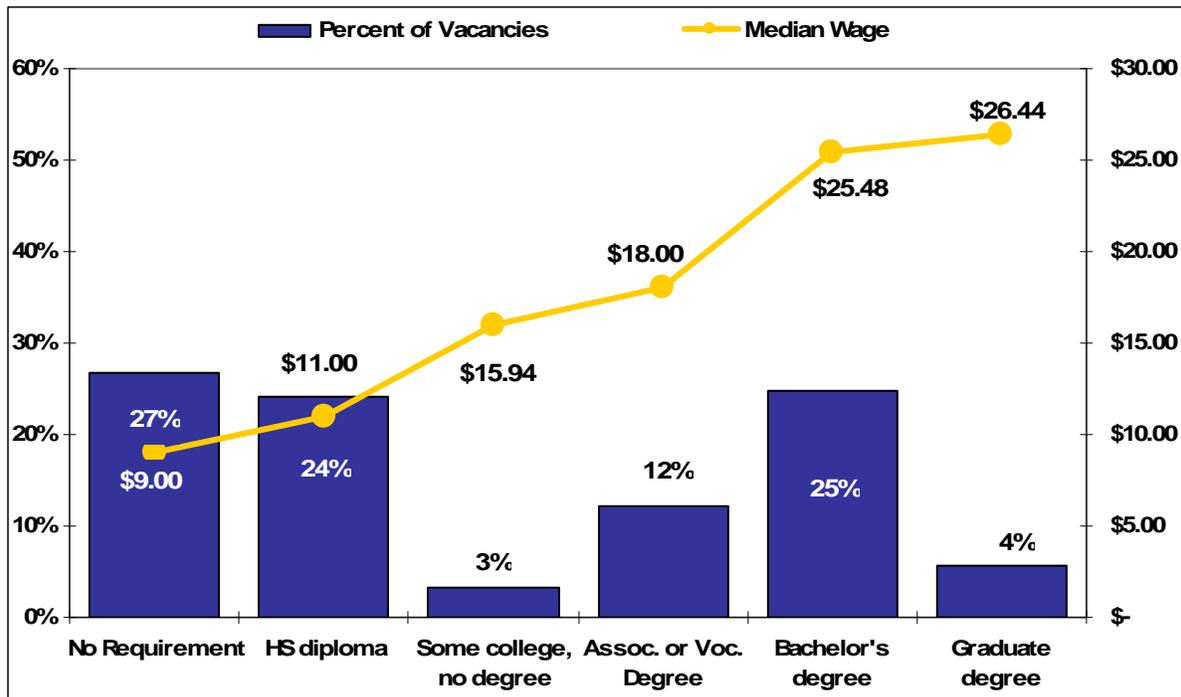


Sources: Annual Net Migration by State, Age-Group, and Degree-Level (ACS). National Center for Higher Education Management Systems (NCHEMS). <http://www.higheredinfo.org/> and Digest of Education Statistics Table 310. National Center for Education Statistics (2006).

Job Vacancy Information

In April 2008, The Washington Employment Security Department surveyed over 16,000 Washington employers regarding current job vacancies. Figure 6 shows the survey results for vacancies in full time and permanent positions by education and wage level. The chart shows clearly that vacancies with higher training requirements pay more, and that almost all of the vacancies requiring postsecondary education required a college degree or certificate. Nearly half of all vacancies in full time and permanent positions (career-oriented jobs) require some postsecondary education, and among those the majority required a baccalaureate degree. A similar distribution pattern by education and wage level is found when part-time and temporary positions are included. The survey results found that 86 percent of all baccalaureate vacancies were full time positions, and 63 percent of all mid-level vacancies were full time. While this is an analysis from a single point in time, the general pattern of vacancies by education and wage level is consistent with the pattern found in the survey results of the last few years.

Figure 6
 Full-Time/Permanent Vacancies by Education and Wage
 Washington State, April 2008



Source: Employment Security Department, special analysis conducted for the HECB based on data from the Washington State Spring 2008 Job Vacancy Survey.

Recent Reports on High Demand Occupations

Washington has conducted a number of recent studies that, in various ways, demonstrate a common theme. The state's existing supply of workers in specific fields and at the postsecondary level is insufficient to meet the demand of the available jobs Washington employers need filled. The number of students completing degrees and certificates needs to increase at a rate faster than population growth, or the gap is projected to grow wider in the next decade.

"A Skilled and Educated Workforce"

In 2006, the Higher Education Coordinating Board (HECB), the State Board for Community and Technical Colleges (SBCTC), and Workforce Training and Education Coordinating Board (WTECB) issued the first of their biennial assessments of employer demand for workers. In "A Skilled and Educated Workforce," informally known as the inter-agency "Joint Report," the agencies identified considerable gaps between the numbers of job openings that are predicted to exist annually between 2007 and 2012 and the Washington workforce that is expected to be produced by the state's higher education system in 2004-05. According to the data assembled in the 2006 report, the state was not producing enough graduates at either the mid-level or the graduate/professional level to meet estimated employer needs.

Task Force on the Supply and Demand of Math and Science Teachers

In reviewing workforce supply and demand numbers, the 2006 Joint Report suggested that (in the aggregate) the supply of educators (of all types) is sufficient to meet demand. However, a more sharply focused analysis reveals some important exceptions. The Professional Educator Standards Board (PESB) has estimated that—given the new graduation requirement of three years of math in the state’s public high schools—almost 500 more high school math teachers than are currently employed will be needed by 2010-2011.²⁴ Already all Educational Service Districts in Washington report shortages of math and science teachers.²⁵ Additional evidence of this undersupply can be seen in the endorsement records the Standards Board collects. Where teachers are assigned to teach outside of their endorsement areas, the area to which unendorsed teachers are most frequently assigned is math.²⁶ The shortage of Washington science and math teachers is also evident in the results of a five-year study of the subject-area endorsements issued to high school teachers between 2002 and 2006. Of the 906 endorsements issued for math, biology, chemistry, earth science, science, physics, and mid-level math/science, 343—or almost 38 percent—were issued to out-of-state teachers, not to Washington residents.²⁷

So although the current job numbers suggest that there are sufficient educators to fill current math and science jobs, estimated future needs predict shortages, and a determined and innovative multi-faceted approach will be necessary to increase the numbers of Washington students preparing to become math and science teachers in the state’s schools.

The PESB estimates that the newly adopted high school math requirements will require an additional 450 trained math teachers. This is on top of a current and persistent shortage in the field. The Office of the Superintendent of Public Instruction regularly conducts a survey of school districts to identify areas where districts are having the greatest difficulty filling positions. The most recent report also included information on endorsements earned to get a better sense of the needs in specific shortage fields.

The 2006 analysis finds that the shortage level in most areas has increased since 2004. The study further finds that although the roles in the serious shortage list have varied somewhat from survey to survey, three clusters of roles have shown deep and persistent shortages since 2000—special education, math and science, and educational staff associates.

All indications are that the need in these areas will continue, and possibly even grow, as the shortages that already exist are compounded by the federal teacher qualification rules, a change in the high school math requirement, and potential changes in the high school science requirement.

²⁴ Jennifer Wallace, presentation by the PESB Executive Director to the *Ensuring an Adequate Supply of Well-Qualified Math and Science Teachers Task Force*, August 15, 2008. Slide 2.

²⁵ Wallace presentation, PESB, slide 3.

²⁶ Wallace presentation, PESB, slide 10.

²⁷ Wallace presentation, PESB, slide 7.

In addition to the teaching positions, OSPI finds some shortages of middle and high school principals and superintendents and considerable shortages of school psychologists, occupational therapists, school nurses, and speech and language pathologists.

Health Care Personnel Shortage Task Force

The report of the Health Care Personnel Shortage Task Force, *Progress 2007*, presents a detailed account of another area in which demand exceeds supply for Washington workers: health care. Data from a 2006 job vacancy survey show that Washington was short more than 12,000 health care professionals.²⁸ The Task Force report also recounts the results of a 2007 hospital workforce survey that showed high vacancy rates for registered nurses and physicians in various important specialties. Thirty percent of the needed cardiology positions, for example, went unfilled, as did 16 percent of the needed pediatrics positions.²⁹

In addition to the existing vacancy rate, the Task Force also analyzed the projected gap between occupational forecasts and the expected supply of health care graduates. By 2014 the Task Force predicts that Washington will need to produce an additional 3,500 registered nurses, more than 2,000 physicians, and almost 600 physical therapists to fill all the positions that will be needed.³⁰ In fact, if there is no increase in the numbers of graduates of nursing programs, by 2025 Washington is expected to need an additional 25,000 registered nurses.³¹

Context of High Employer Demand in Setting Degree Production Targets

Together, these studies convey a common theme. They report data from different sectors, over different years, projecting forward to different windows of time in the future. But collectively they demonstrate that Washington lacks enough workers to meet its present economic needs, and that this undersupply is expected to grow larger during the next decade.

In order to recommend the policy changes best suited to address this problem, it needs to be understood in the context of several important factors.

Skills

At the mid-level, the 2006 Joint Report indicates that the current (2005) supply of newly prepared workers is sufficient to meet only 83 percent of the expected job openings at this level in 2011. This expectation is consistent with workforce demand nationwide. The Council

²⁸ Employment Security Department, *Job Vacancy Survey*, April 2006; cited in Health Care Personnel Shortage Task Force report, *Progress 2007*, p. 5

²⁹ Health Workforce Institute and the Washington State Hospital Association, "Results of the 2007 Hospital Work Force Survey," June 2007; cited in *Progress 2007*, pp. 5-6.

³⁰ Workforce Training and Education Coordinating Board, *Progress 2007: Report of the Health Care Personnel Shortage Task Force*, pp. 6-7; June 2008.

³¹ The Center for Health Workforce Studies, "Washington State Registered Nurse Supply and Demand Projections: 2006-2025," Final Report #12, June 2007; cited in *Progress 2007*, p. 7.

on Competitiveness report shows that mid-level jobs are projected to grow at a faster rate than higher skilled positions.³²

An accurate assessment of labor market demand in Washington must also consider the skills that qualify workers for a wide variety of jobs and levels of responsibility. Since, as the Joint Report points out, many graduates of the most specialized degree programs end up working in a broad range of occupations, plans for training workers for even the highest demand jobs will need to be more broadly conceived. It would be unwise, the report says, “to make 1:1 assessments of supply and demand based on academic field of study and occupation.”³³ Employers need more than technical expertise. Even in the most highly technical fields, employers will need a broader set of skills—in management, communications, and collaboration, for example—to be successful.

As the U.S. Department of Labor has shown, most workers will have at least 10 different jobs before they are 40 years old.³⁴ To adequately meet employers’ needs, the higher education system will need to focus on the full range of skills employers will need.

FTE Capacity versus Student Demand

In developing strategies to expand degree production, one must consider the relationship between educational capacity and student demand. On the one hand, in some areas increased capacity is clearly needed. For example, in the health professions we have a ready supply of students who are prepared to enter these majors. By adding capacity, between 2001 and 2006, the number of students graduating from the state’s health care education and training programs grew by more than 30 percent, and student demand for placement in these programs continues to exceed supply.³⁵ Despite student demand, increasing Washington’s capacity to prepare students for these high-paying, in-demand jobs—and to prepare additional professionals to meet the state’s health-care needs—is difficult. It requires increased funding to add faculty and more clinical sites, increased classroom and lab space, and additional equipment—all investments that Washington will need to make in order to close the workforce gap in health care. The problem is compounded by a shortage of qualified faculty willing to teach for what the colleges are able to pay.

At the same time, in some areas, finding interested and prepared students is the limiting factor. In many cases there is room to serve more students with existing capacity. In these fields the priority is on strategies to increase student interest. Increasing the supply of math and science teachers, for example, will require attracting more students to major in these critically needed specialties. According to a PESB analysis, math preparation programs in the state’s four-year colleges, public and private, during the academic year 2006-2007 were

³² The Council on Competitiveness, *Thrive, the Skills Imperative*, (12-13).

³³ HECB, SBCTC, and WTECB, “A Skilled and Educated Workforce”, January 2006, p. 10.

³⁴ Bureau of Labor Statistics, “Number of Jobs Held, Labor Market Activity, and Earnings Growth among Younger Baby Boomers: Recent Results from a Longitudinal Survey”, 2004.

³⁵ WTECB, *Progress 2007*, p. 8.

dramatically underutilized. There was room for 1,397 students, but only 307—or less than 22 percent—enrolled, and only one of ten state colleges filled its seats.³⁶

K-12 Preparation

Closely connected to capacity is a critical added factor impacting workforce development in Washington. In order to maximize the benefit of expanded capacity, more students need to be prepared in K-12 to take full advantage of the academic and skills training available to them after high school. We have a pipeline problem with too many leaks. For every 100 ninth graders, 76 make it to high school graduation, 40 enroll full time in college, and just 19 of those come out the other end with a degree.³⁷

In a recent comparison of Washington SAT test-takers, some shifts in the profile of Washington's college-bound students may be seen regarding preparation and interest in high demand fields of study. Among SAT test-takers, slightly more students in 2008 than in 2005 indicated they intend to major in health and allied services, engineering and engineering technology, or biological sciences. Similarly, in 2008 more students than in 2006 indicated that they had taken four years of high school math courses and four years of high school science courses. The numbers of students taking AP math and science exams in the academic year 2006-07 also increased markedly over the numbers of those taking the exams in the 2005-06 academic year. In biology, calculus, chemistry, computer science, environmental science, physics, and chemistry, the numbers of students taking the exam increased in 2007.³⁸

The trend of the SAT and AP data is encouraging, but the total numbers of students included in the analysis remain small, and the increases in student preparation and interest in STEM education are still limited. What they reflect more than anything is the kind of changes that will need to occur on a broader scale for Washington's degree production efforts to be successful.

Demographics

Developing an effective higher education plan to meet Washington's economic needs must also take into account important demographic trends in the state. The Higher Education Coordinating Board has convened a work group to look into the demographic trends and their policy implications.

Their findings include the following observations:

- The high school graduating class is becoming more diverse, and without changes in the success of minority students in high school and improvements in the rates at which they continue on to postsecondary education, the portion of high school graduates who continue to college will decline significantly. If, however, we improve

³⁶ Wallace presentation, PESB, slide 6.

³⁷ Higher Education Coordinating Board, *2008 Strategic Master Plan for Higher Education*, (7).

³⁸ Unpublished HECB analysis of data collected by The College Board, in *College Bound Seniors: Washington State Profile Reports*.

performance, we stand to see substantial gains in the numbers of students entering our postsecondary education system.

- In Washington, a substantial pool of adults in the workforce has the potential to upgrade skills and earn degrees. For individuals aged 18-34, regardless of employment status, a considerable number have less than a college degree.
- Retention and degree-completion rates show a large number of students drop out or stop out at both four-year and two-year public institutions. Retaining more of these students through degree completion and improving transfer rates at 2-year institutions could produce thousands of additional degree completions in our system.

The Demographics and Policy Work Group is developing a series of policy recommendations to address each of these issues.

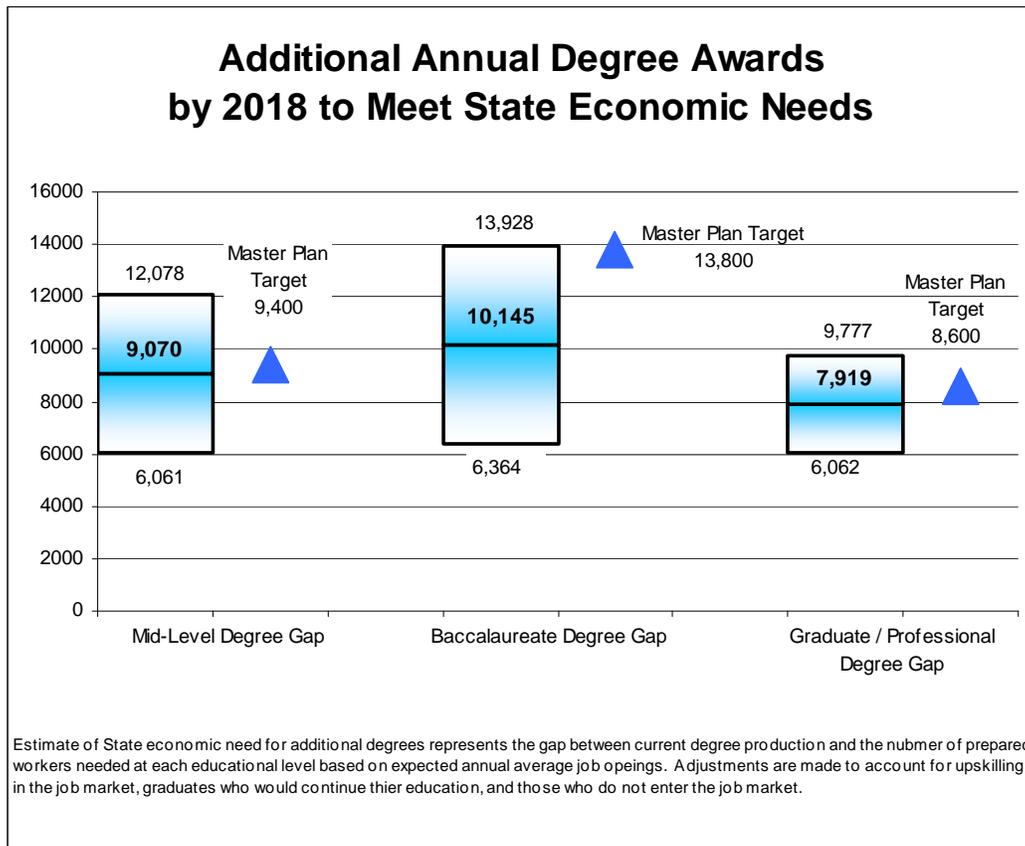
Review of Degree Production Targets by Education Level

In order for the work group to review the degree production targets in the Strategic Master Plan for Higher Education based on economic need, it was important to identify a preferred methodological approach. A subgroup of the work group, with knowledge and understanding of data sources and economic analysis, looked at the issue and adopted a method of analysis based on the educational profile of the existing state workforce and forecasts of future new and replacement job growth.

New Analysis of Supply-Demand Gaps

Figure 7 shows the results of the economic analysis that is described in more detail in Appendix A. In the chart, the number of additional degrees needed to fill the gap is indicated in **bold**. The shaded areas show how the number of degrees needed changes if the base demand forecast (total new and replacement jobs) is changed, increased or decreased, by 10 percent. The triangles indicate the current Strategic Master Plan targets. Note that the baccalaureate degree production estimate is highly sensitive to changes in the total aggregate demand estimate (new and replacement jobs in 2018) since Bachelor's degree holders comprise such a large share of the workforce. The analysis also shows that the current Master Plan target for baccalaureate degrees is at the top of the range identified through the economic need analysis.

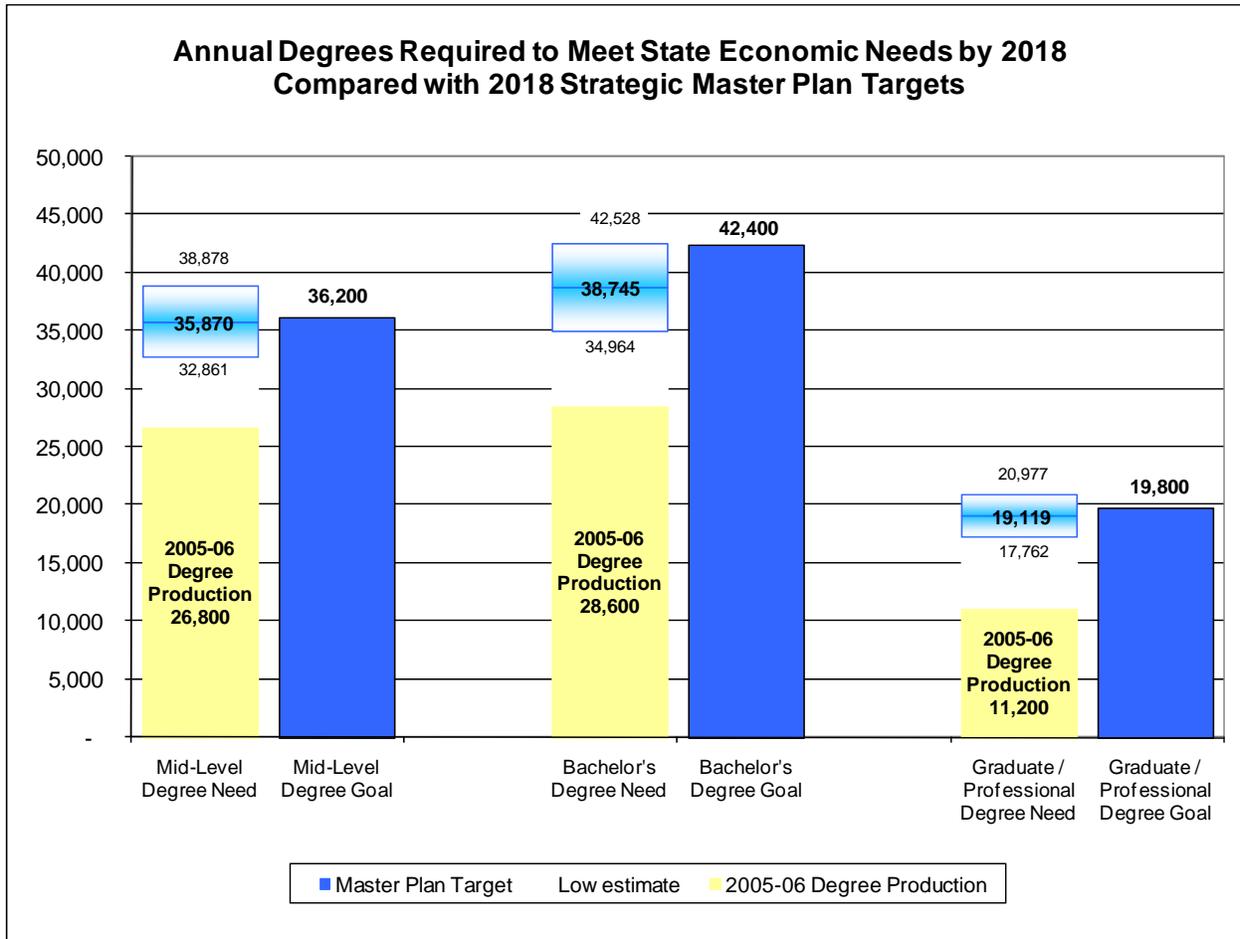
Figure 7



Source: Higher Education Coordinating Board estimates.

Figure 8 puts this gap discussion in the context of total current degree production and the Master Plan targets (the blue bars). This chart shows how ambitious the goals are. It also shows that **regardless of what the exact size of the gap between current supply and forecast 2018 demand is, or is likely to be (the blue shaded areas), the level is so much higher than current production that it makes sense to immediately begin increasing degree production at all three education levels.**

Figure 8



The economic analysis indicates that the mid-level target in the *Strategic Master Plan* could be slightly low, since the analysis failed to consider any gap that may exist for one-year certificates³⁹. Based on this analysis, it would be difficult to estimate how much of an upward adjustment may be appropriate, so it is recommended to stay with the mid-level target for now and closely monitor supply and demand going forward.

³⁹ Data on forecast demand for workers with one year certificates is not reported by Employment Security or BLS, so the work group was unable to identify a reliable source of data for estimating forecast demand. Our state confers about one fifth as many one-year certificates as Associate degrees.

The analysis also indicates that the baccalaureate target in the *Strategic Master Plan* may be high. While the estimate is within the range of the economic analysis results, it may be appropriate to modify the baccalaureate target to 39,000 degrees annually by 2018 to align more closely with the mid-point of the range. The work group therefore recommends that the HECB consider modestly reducing the baccalaureate degree target. That said, the workgroup emphasized, the need to continually monitor supply and demand with the understanding that a slight adjustment of the goal does not change the magnitude of the challenge.

The work group is also recommending that the graduate/professional degree target not be changed, based on the results of the analysis.

In sum, the work group believes that quantifying the gap between current supply and forecast demand for degrees and certificates is a complex problem. Given our need to make long-term forecasts, our best available data and methods only allow us to make a “ballpark” estimate of supply-demand gaps. The focus of future analyses should be on existing gaps in specific occupational areas and where feasible, shorter-term projections. The *Strategic Master Plan* takes an appropriate approach in setting an aspirational goal for degree production based on external benchmarks, given the document’s statutory 10-year planning horizon. Economic analyses should be used as an additional tool to help triangulate toward long-term degree production targets that represent the combined results of externally-benchmarked aspirational goals (tied to our economic competition) and the best available information about the state’s economy.

The work group also wanted to emphasize the relative risks of under- and over-estimating demand for skills. Failure to estimate and accommodate employer demand for skills is akin to putting the parking brake on the economy. Employers need to go farther to look for skills and pay more when they find them, which add to their costs and makes businesses less competitive. Some employers will simply go without, settling for workers who lack the knowledge and skills they need. Others will move their business to where the needed workforce is more plentiful. In fact, more than half of the firms responding to the Workforce Board’s employer survey (cited above) that reported difficulty finding skilled workers stated that this difficulty had resulted in lower productivity, reduced product or service quality, and/or reduced production output or sales.

On the other hand, overestimating employer demand may result in state and personal expenditures on education that could have been avoided. However, there is reason to believe that this “over-expenditure” would not be a dead-weight loss to either the worker or the government. Research shows that college graduates who experience difficulty finding employment locally related to their field of study tend to find other productive outlets in the economy for their skills and abilities. Also, one could consider someone with more knowledge and skills than they need for their current job to have “banked” productive capacity, which can be tapped into at a later date when these skills are in demand.⁴⁰

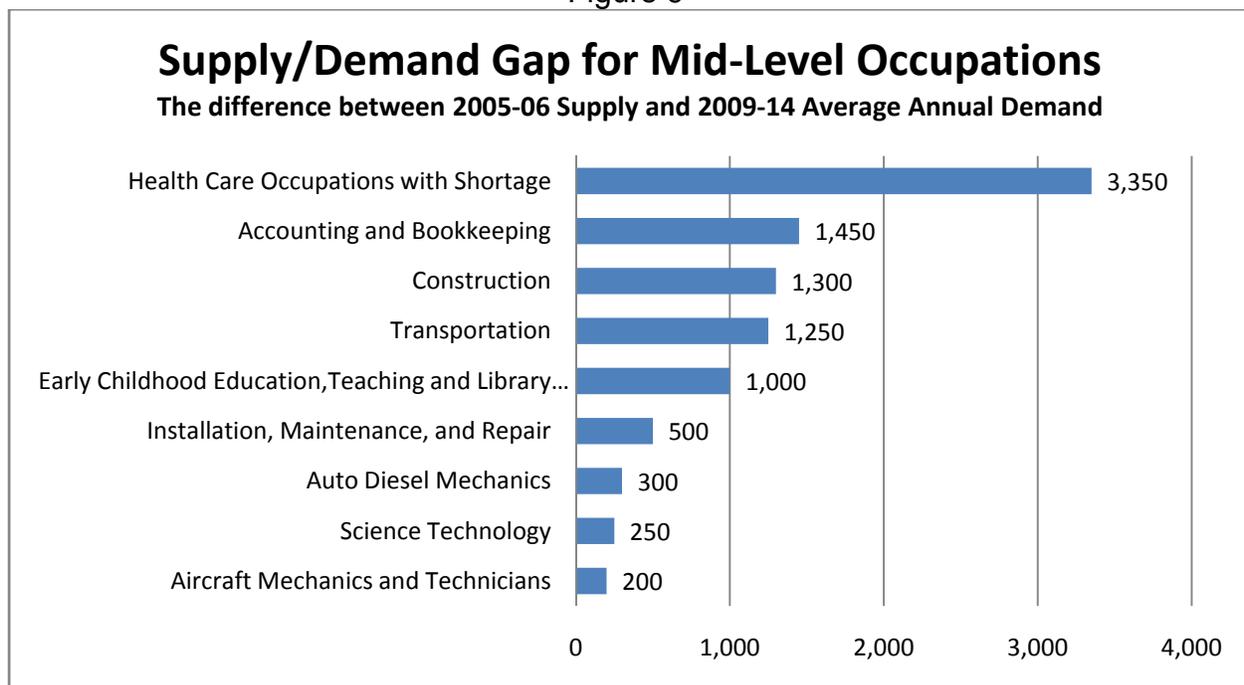
⁴⁰ William Zumeta, “How Much Higher Education Does the Nation Need?” Evans School Working Paper, June 2008, p. 3-4.

Measuring Gaps in High Demand Occupations

A preliminary analysis conducted for a 2008 update of the inter-agency Joint Report provides more solid evidence of degree gaps for high demand occupations than we were able to provide through the ballpark analysis discussed above. The Joint Report analysis uses 2006-07 as the base supply year, and average annual demand is for the period 2011-2016. The new analysis finds aggregate gaps at all three levels—mid-level, baccalaureate, and graduate/professional, and in the same occupational clusters as the 2006 study. The results are shown in Figures 9 and 10 below for the mid-level and the baccalaureate and graduate levels.

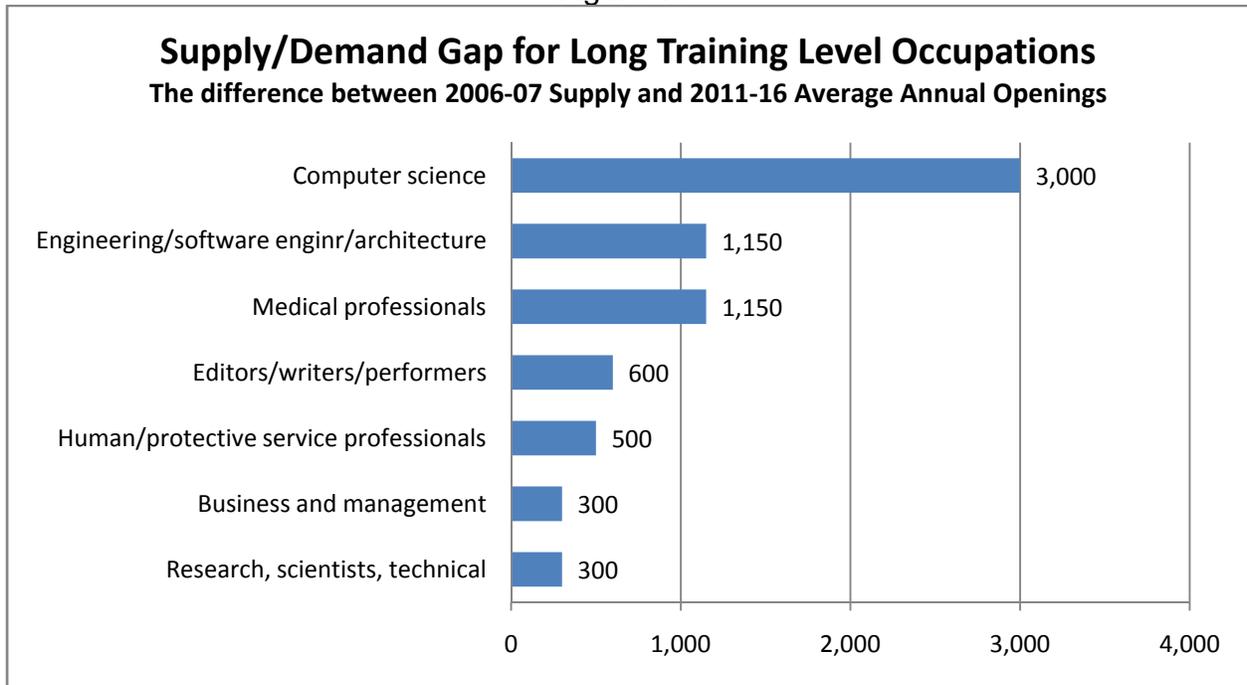
The preliminary analysis results in Figure 9 show that several high-demand occupations will need twice as many workers annually as are currently graduating with the requisite mid-level education and training. Among the areas with the largest relative gaps (supply as a percentage of demand) are aircraft mechanics and technicians, science technology, accounting and bookkeeping, and early childhood education, all showing current supply at less than half of forecast demand.

Figure 9



The results in Figure 10 also show that the supply of baccalaureate and above workers has increased in most occupations, but projected future demand has also shifted, sometimes dramatically. As in 2006, the occupations with the largest gaps remain engineers, computer science, medical professions, editors/writers/performers, and human/protective services.

Figure 10



A comparison of the preliminary data with the 2006 analysis indicates that in areas such as engineering and computer science, the gaps between current supply and forecast demand have grown since 2006. In almost all occupational clusters, supply remained steady or grew over the last two years, but projected future demand grew at a faster rate, especially in the areas where gaps have widened.

Building Capacity to Analyze Employer Need and Improve Program Planning

Economic demand (employment and economic development goals and objectives) should be a major factor guiding higher education resource allocation decisions. But this can only occur if reliable information is generated, widely shared, and wisely used at the state, local, and institutional levels to guide strategic direction and resource allocation decisions. It is by no means the only type of demand that should be considered. Student interest and community needs (promoting, among other things, social cohesion and quality of life) should also be considered. This report has tried to make clear the direct connection between educational attainment and economic vitality. It only makes sense that we strive to maximize the potential of this relationship by considering economic need when forming the higher education policy agenda.

Building Consensus on Analytic Methods

Having heard from the agencies and economists on how we do long term employment projections and trying to match them with education requirements, the consensus of the work group is that we are simply not very good at it. Most of our demand data is industry-based and needs to be cross-walked to occupations. Many specific occupations exhibit wide ranges of education levels and a range of responsibilities and duties. A further complication are the many educational pathways workers take to enter an occupation, inhibiting our ability to confidently make decisions about where to make targeted educational investments. Finally, and perhaps most importantly, our forecasts are based on what has happened in the past and what we believe is most likely to continue in the future. They do not, and cannot, predict game-changing technologies, changes in public policy, or natural and man-made calamities that can make the past less relevant to the future.

But given these caveats, the work group still believes that it is worth the effort to get the most we can out of what we have, and to make our economic analyses usable and relevant for the kinds of resource decisions we will have to make.

The work group identified the HECB, SBCTC, WTECB “Joint Report” as the best product and process currently underway to form the focus of these efforts. In 2005, the Legislature asked these three agencies to begin a biennial process of assessing how many degrees and certificates were needed at each educational level and what the target occupations should be. They mandated that this analysis use the best available data and analytical techniques. The first report, entitled “A Skilled and Educated Workforce,” was published in 2006 and is currently being updated. For the first time, we have the ability to see how the gaps have changed over a two-year period, and whether they have closed or widened based on a consistent methodology. Some of that new analysis has been presented above.

The work group believes the joint report process can be strengthened in several ways. First, the Joint Report team should devise a mechanism that would allow it to consult with outside technical advisors and other agencies with access to data, possibly in the form of a technical advisory committee comprised of economists, labor market specialists, and education research and policy experts. The group would be used to validate and improve analytical techniques and data sources.

Also, the research process should incorporate employer information (possibly in the form of survey data and employer focus groups) to validate and reality-check findings, and identify trends that should be explored and/or highlighted in the report. If the data indicates a trend that is inconsistent with the current knowledge and experience of employers, that should prompt additional analysis.

Using Analysis Results for Program Planning

Generating reliable forecasts and estimates is only half the battle. The information needs to be used to wisely make resource decisions. If we assume that an analysis will be conducted every two years (the time frame legislatively mandated for the “Joint Report”), then each agency should develop a plan for using that data in its resource allocation decisions and for revising system and institutional goals.

For example, the Higher Education Coordinating Board could use the information to inform the setting or revision of Performance Accountability System degree production targets, or to set targets that may be established in forthcoming performance agreements with the four-year institutions. The information could also be used to set high demand degree production targets and measure performance under the Governor’s Management Accountability and Performance (GMAP) program. At the State Board for Community and Technical Colleges, the information could be used to target discretionary funding for developing and expanding high demand programs where supply-demand gaps have recently widened.

A somewhat more complicated question is how institutions could and should use the analysis to make resource allocation decisions. Clearly, the HECB and the Legislature will be inclined to view requests for high demand or math and science enrollments through the lens afforded by the research results, as would the SBCTC when it reviews High Demand Program funding proposals. This dynamic will provide an incentive for institutions to come forward with proposals for program expansion that align with the analysis.

The objective is to help institutions use the research results to inform their resource allocation decisions and to meet employer needs and economic development objectives. The HECB’s *Regional Needs Analysis* document, first released in 2006, may help. The HECB should look at ways to improve the analysis and make it more useful for higher education institutions, especially regional comprehensive universities and community and technical colleges that are more focused on local and regional economic development needs.

Concluding Observations

Achieving the goals identified in the *Strategic Master Plan for Higher Education* will require implementation strategies based on careful projections of demographic trends and economic needs. It also will require broad commitment to a vision of Washington in which:

- Innovation is fostered and talent nurtured,
- Local imagination is empowered to compete in the global marketplace,
- New and established Washington businesses have access to a workforce with the knowledge and skills to help them grow and thrive,
- All citizens have access to the education and training needed to contribute to—and enjoy the benefits of—the state’s economic success.

The key factor determining Washington’s level of prosperity in the coming decades will be its ability to match talent with opportunity. A major organizing principle for higher education in the state — from the community and technical colleges, to the public and private four-year institutions, to graduate programs in the regional and research universities — should be to align their programs to match talent and opportunity.

The Legislature’s original question, the one that prompted the work group’s efforts, was a good one. We need to validate and temper our externally-benchmarked aspirational targets with the best available economic analysis. It is as important to know where our economy is headed as it is to know the nature of our economic competition. Our long-range targets need to reflect a combination of these critical factors.

What we found was that our best available economic analysis is not very good at telling us with precision what our educational needs will be 10 years from now. Varying just a few key assumptions produces wildly differing point estimates on the size of the supply-demand gap. However, while our current methods may lack the precision we prefer, the other critical finding is that it doesn’t really matter. Current degree production is far below what it needs to be for our state to be internationally competitive and self-sufficient with regard to skills production.

In the 2007-09 biennium, Washington made a momentous step forward in tackling the problem by expanding high demand and math and science enrollments. We also began to tackle the vexing problem of the STEM pipeline by improving K-12 math and science instruction and teacher training. It is essential that we maintain and not back off from this commitment. If we falter, the impact on our economy could be severe.

Simply because we may be unsatisfied with our current capacity to analyze employment trends and predict the future, it does not mean that we should give up trying. In fact, we think it is possible to considerably improve our analysis and make better use of it for state, local and institutional planning purposes. We can also use the analysis to measure progress and performance.

As a state, we are facing an enormous challenge, and the consequences of our efforts to meet this challenge will be significant. At least in part, our recent economic success has been the result of our ability attract talent from outside the state. Talent is and will continue

to be the preeminent defining characteristic of an innovative, high-wage economy. We must improve and expand our capacity to develop that talent, based on a strategy of educating all our citizens for the jobs we currently have and want to keep, and the jobs we hope to have in the future.

Appendix A

Method Used to Estimate Supply-Demand Gaps by Education Level

Washington residents should have the opportunity to compete in the global economy, and our businesses need skilled workers. It is important to ensure that graduates of Washington colleges and universities are trained not just to the minimal skill requirements for a job, but are provided with education that will ensure they are competitive for those jobs and in a position to adapt and grow throughout their careers.

With this in mind the HECB convened an outside workgroup made up of leaders from around the state representing business and industry, labor, academia, state and regional planning agencies. Working with this group the HECB sought to understand the skill expectations of employers, the changing employment demand, and the pipeline of students prepared to move on to higher levels of education. For this purpose, a new methodology was developed for analyzing the aggregate supply-demand gap by education level.

The analysis estimates base gaps between current supply and forecast demand found at each level of education. Forecast average annual new and replacement jobs for the period 2011-2016 (the longest forecast available from the Employment Security Department) were used to estimate 2018 demand. Demand was then adjusted by assuming it will continue to grow at historic rates (using 1999-2006 trend)⁴¹. Upskilling is the change in training requirements of the workforce over time, based primarily on differences in industry growth rates and changes in occupational training requirements⁴². In this way, the demand forecast incorporates both increases in the education requirements of Washington occupations and forecast changes in employment in industries that employ highly skilled workers.

Therefore this analysis assumes that between 2006 and 2018, the percentage of workers age 25-64 with an Associate Degree will grow from 10.9 percent to 13.0 percent, Bachelor's degree-holders will increase from 22.7 percent to 24.1 percent and workers with graduate or professional degrees will increase from 12.2 percent to 13.4 percent of the employed workforce.

In order to calculate the number of additional degrees needed to fill the gap between ready-to-work new graduates and new projected annual demand, it is also necessary to add in those graduates who are likely to leave the labor force and those that need to go on to further education to address the gap at the next level in future years.

The result of these adjustments is provided in Figure 11. Based on the analysis it is clear that Washington needs to do more to ensure that enough students are prepared at each level of education to meet the needs of the economy. At the mid level, the gap using this approach shows a need for more than 9,000 additional degrees and certificates annually by

⁴¹ The 1999-2006 trend was compared to other an estimate of general upskilling between 1990 and present. The current analysis uses a more conservative estimate of the upskilling trends in the economy.

⁴² Changes in occupational training requirements result from a combination of employer hiring preferences and changes in the skill needs and expectations among employers for workers to adapt to changes in the workplace, such as the use of new technology or the provision of new products and services.

2018. At the baccalaureate level more than 10,000 additional degrees are required, and at the graduate level the gap is nearly 8,000 degrees.

Figure 11
2018 Degree Production Target Based On an Estimated Supply-Demand Gap

Education Level	Projected 2018 Supply Gap (Base Demand Estimate with Upskilling)	Additional Graduates Who Leave the Labor Force*	Additional Graduates Needed to Go On to Further Education**	Additional Degrees Needed by 2018	Existing SMP Degree Targets
AA Degree	5,707	300	3,135	9,141	9,400***
Bach. Degree	6,943	340	2,863	10,145	13,800
Grad./Prof. Degree	7,045	874	–	7,919	8,600

* Adjustment due to graduates that do not enter the labor force (including non-resident and international graduate students, but not including full time continuing students at the mid and BA levels), based on historical data. Adjustment is 4 percent of the gap at the mid-level, 5 percent at the Baccalaureate level, and 13 percent at the graduate/professional level.

** Mid-level figure based on current ratio of transfer completers to BA degree production. Baccalaureate figure is based on the current ratio of continuing BA students to current graduate degree production.

*** Mid-level Strategic Master Plan target also includes one-year workforce education certificates and apprenticeship. Neither the demand nor the supply of one-year certificates or apprenticeships has been included in this analysis because demand data is not available for that level of education. In the most recent year, Washington public community and technical colleges conferred about one-fifth as many one-year certificates as Associate degrees.

It is important to note that the Strategic Master Plan production target is for mid-level degrees and certificates which include one-year certificates and apprenticeship positions, as well as Associate degrees. Neither of these non-degreed credentials was included due to a lack of reliable demand data, so any gaps that may exist for them are not reflected in the analysis. It is therefore likely that the estimate of additional AA degrees needed by 2018 is a low estimate of the mid-level gap.

Additional information on the methodology used for this analysis is available by contacting John Lederer at the Higher Education Coordinating Board at johnle@hecb.wa.gov or (360) 753-7822.