A Report from the California Business Roundtable and the Campaign for College Opportunity

EXECUTIVE SUMMARY

Embargoed until 10am PST April 26th 2006

Keeping California's Edge

THE GROWING DEMAND FOR HIGHLY EDUCATED WORKERS

"…the combination of growth and replacement of retiring workers poses a significant challenge in terms of providing the needed workforce to keep California's economy competitive."

In order to maintain its position as a global economic leader and innovator, California must meet the increasing industry demand for highly educated workers who will be a major driver of much of the state's economic growth. Among occupations requiring a college education, the combination of growth and replacement of retiring workers poses a significant challenge in terms of providing the needed workforce to keep California's economy competitive.

Today, California's economic strength relies in large part on its comparative advantage in fast-growing, high-value industries. These industries in turn rely on a highly educated workforce. "Keeping California's Edge" finds that these workers are not only important today, but they will become even more important to the state economy in the near future. If California fails to provide an adequate workforce of highly educated workers, it risks negative economic impacts far beyond the immediate effects on those workers and their employers.

The major contribution of "Keeping California's Edge" is the analysis of the relationship between higher educated employees and the economic value created in the California economy. Looking to 2022, the study identifies the largest occupations with high educational demands, analyzes the economic value created by those workers, and identifies the industries with the most at stake in terms of the numbers of highly educated workers and the economic impact of those workers.

The Campaign for College Opportunity

California Business Roundtable

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Applied Research Center, California State University, Sacramento ■ April 2006

"While current requirements are that 26% of jobs require an Associate Degree, Bachelor's Degree or higher, 34% of employment growth will have such a requirement."

KEY FINDINGS:

1) **California employers and industries are demanding greater levels of education.** Through 2022, the study finds that demand for higher-educated employment with a college degree will grow by 1,808,000 – 48% growth – while employment requiring less than a higher education degree will grow by 3,575,800 – 33% growth. While ***current*** requirements are that 26% of jobs require an Associate Degree, Bachelor's Degree or higher, 34% of employment ***growth*** will have such a requirement. (see Figure 1, Absolute Growth column)

2) **A major retirement wave of talented, highly-skilled workers with college educations is about to hit California industry.** The largest higher-educated cohort of workers to date – the Baby Boom generation – is approaching retirement. California needs to meet not only the expected growth of industries, but also to replace 1.4 million workers with higher education who will be retiring or otherwise leaving their occupations. The need to replace retirees and other separations is almost equal to the need created by growth. (see Figure 1, Separations column)

3) **The potential lack of workers with a higher education will be felt throughout the economy, but a constrained supply of these workers will hit certain industries hard.** The three top industries in terms of the number of highly educated workers needed in 2022 are professional, scientific and technical services; education; and healthcare. In three additional industries, the highly educated workforce will yield substantial value added economic impacts: finance, manufacturing, and information. These are further discussed in the next section.

4) **The largest part of the demand for a higher educated workforce, both currently and in terms of growth, is at the Bachelor's degree level, while percentage increases are highest at the Associate and graduate levels.** Between 2002 and 2022, occupational requirements suggest the need for 192,000 additional workers with postsecondary vocational education (38% increase), 287,000 additional Associate degree holders (53%), 1,274,000 additional Bachelor's degree holders (46%), 212,000 additional Master's and Professional degree holders (50%), and 35,000 additional PhDs (73%).[1]

5) **Small changes in the proportion of the workforce with higher education result in substantial economic impacts.** A 1% increase in the share of population with a Bachelor's degree, combined with a 2% increase with an Associate degree or some college, results in $20 billion in additional economic output, $13 billion in value added, $1.2 billion more in state and local tax revenues annually, and 174,000 new jobs created.

[1] *It should be noted that BLS data do not show teaching credentials as Masters or Professional degrees. Also these data are for occupations with 1,000 or more employees in the state.*

Figure 1

Workforce Demand by Required Level of Education Growth and Replacement, 2002-2022			
Type of Degree	2002 to 2022		Total Demand Growth and Replacement
	Absolute Growth	Separations	
Associate Degrees	287,600	204,400	492,000
Bachelor's Degrees	1,274,000	1,021,800	2,295,800
Master's & Professional Degrees	212,000	165,200	377,200
Doctorate Degrees	35,000	20,400	55,400
Total Highly Educated Employment	1,808,600	1,411,800	3,220,400
Total <Highly Educated Employment	3,574,800	5,521,600	9,096,400
Total Employment	5,383,400	6,933,400	12,316,800

Sacramento State Applied Research Center
Data Source: California Employment Development Department, California Occupational Projections 2002-2012
NOTE: Estimates for 2022 were calculated using a linear projection of the 2002 – 2012 change.

THE INDUSTRIES WITH THE MOST AT STAKE

"Keeping California's Edge" identifies major industries or sectors most dependent on a highly educated workforce. These are the top industries based on two criteria – the projected number of college-educated workers demanded and the economic impact of those workers on their industries and the state.

Three industries will have the largest number of highly-educated workers (see Figure 2):

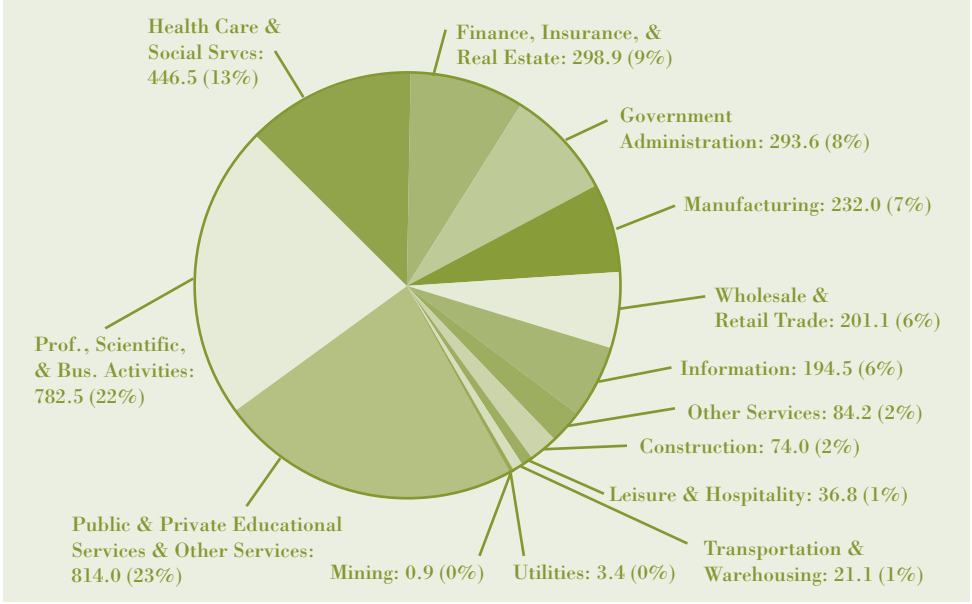
1) **Professional, scientific and technical services:** This industry ranks nearly first both in terms of number of highly educated employees and the economic impact of those employees. This sector will account for over 780,000 employees in occupations requiring higher education, with those workers producing $71 billion in value added impacts in the economy. It includes engineering, scientific, architectural, legal, accounting, advertising, and management services, as well as computer system design services. These industry sectors have critical relationships with other industry sectors and in many ways concentrate the highly educated workforce that serves much of the economy. This sector is also one in which California is highly specialized compared to other states.

2) **Education:** By 2022, California faces the need for 830,000 teachers in preschool, elementary, secondary, adult and higher education. Among the top occupations analyzed, the teaching profession represents the ***single largest*** occupation requiring higher education. Providing an adequate number of qualified teachers will be one of the largest challenges facing California's workforce at the higher education level due to the large number and the high educational requirements. It is unlikely, however, that the state can tackle this demand without meeting the overall demand for workers with Bachelor's degrees.

3) **Healthcare:** No other industry sector faces educational needs with as large an impact on the life of Californians – literally – as healthcare. Among workers in the top 45 occupations requiring an Associate degree, Bachelor's degree or higher, 446,000 will work in this sector, placing healthcare 3rd in terms of the number of highly educated workers needed. This report finds that

the healthcare workforce will be substantially dependent – by far more than any other industry – on California community colleges and similar private institutions. In 2022, the Healthcare and Social Assistance industry sector will employ 37% of the top occupations requiring Associate degrees or postsecondary vocational education, twice as much as the next largest sector (see Figure 4). Employer demand will total 317,000 registered nurses, 78,000 licensed vocational nurses, 36,000 dental hygienists, and approximately 150,000 health technicians in various specialties.

Figure 2 ■ Industries with Greatest Number of Higher Education Employment (In Thousands)



Sacramento State Applied Research Center
Data Sources: California Employment Development Department, California Occupational Projections 2002-2012 and California Industry-Occupational Matrix 2002-2012.
Note: Based on analysis of the 45 top higher educated occupations at Associate, Bachelor's or higher levels. Estimates for 2022 were calculated using a linear projection of the 2002 – 2012 change.

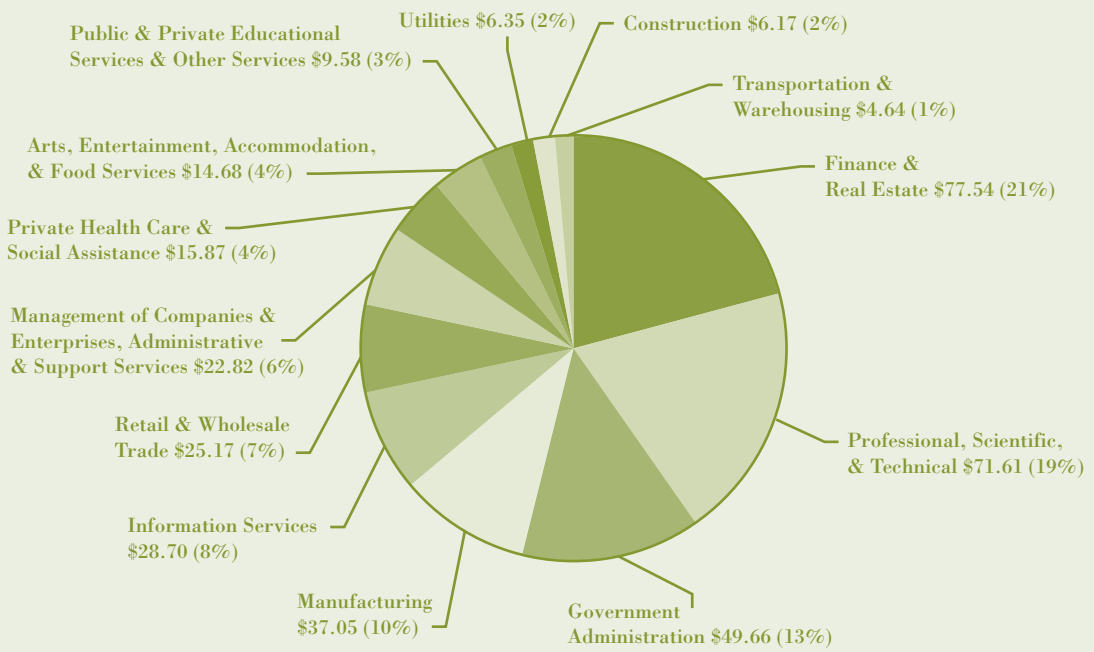
In three additional industries, the highly educated workers will have substantial value added economic impacts:

1) **Finance:** The finance sector, which includes banking, insurance, securities and other financial and investment sectors, as well as real estate, will constitute the single largest area of value added economic impact due to the higher educated workforce. With a total of $77 billion in economic activity generated by highly educated workers in 2022, a constrained supply of these workers in this sector will have substantial economic impacts. The sector ranks fourth in terms of the number of highly educated workers required.

2) **Manufacturing:** California's manufacturing sector includes a broad array of industry activities ranging from food processing, petroleum and chemical manufacturing, computer and electronic manufacturing, and much more. While the sector as a whole has declined in employment due to a variety of factors, the sector in California is increasing in its educational requirements. Approximately 230,000 higher educated workers will produce $37 billion in value added economic impacts in 2022. In this and other similar highly productive sectors, small changes in the supply of workers will result in substantial economic losses to those industries and to the state as a whole. For example, one highly educated employee in the computer manufacturing industry generates enough value in the economy to support 3.7 other employees.

3) **Information:** The information sector includes a number of industries for which California is well known, notably software design, internet, telecommunications, motion picture, sound recording, broadcasting, and publishing. A workforce of 194,000 highly educated workers will generate $28.7 billion in economic activity in 2022, placing it fifth

Figure 3 ■ 2022 Value Added Impacts of Top 45 Higher Educated Occupations (Values are Given in Billion of Dollars)



Total Value Added Economic Impacts: $370.94 Billion

Chart excludes Agriculture, Forestry, Fishing & Hunting; and Mining Sectors
Based on the EDD base-case IMPLAN model.
Note: Based on analysis of the top 45 higher educated occupations at Associate, Bachelor's or higher levels.

among industries in terms of economic impact of the highly educated workforce. California is rightly known for its strength in the information sector, which represents one of the top industries in which the state is specialized.

The Government Administration sector, which includes courts, national security and dozens of other public services, will also require a large number of college-educated workers and will yield large economic impacts as well.

Beyond these sectors, every industry sector of the economy depends in some way on a workforce and occupations with higher education requirements. For example, by 2022, 800,000 management positions, 770,000 computer and mathematical positions, and 620,000 business and financial operations positions will be critical to every industry. Industries without a large proportion of their workforce requiring postsecondary vocational education or college degrees – such as construction and agriculture – nevertheless require highly educated workers in key positions.

THE CONTEXT

California has long been regarded as a center of innovation and industry. The state ranks as the sixth largest economy in the world[2] and much of this economic success has been driven by a highly-educated workforce. In fact, California's population is easily among the top 10 in the world in terms of the number of people with postsecondary education – ahead even of the United Kingdom.

Yet, looking ahead, California's competitive advantage achieved through a highly educated workforce – and therefore our economic vitality and quality of life – may be at risk.

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[2] *California Legislative Analyst's Office CalFacts 2004.*

"…providing better opportunities for California residents – and especially our young people – to meet our future employment needs is both a practical and a valuable public policy goal."

California's population is growing in regions of the state and among ethnic groups with lower levels of educational attainment. While a substantial majority of jobs in California will not require post-secondary education or a college degree, many of these jobs will have a strong relationship to occupations and industries which do require higher education.

A major recent study projects a shortage of college-educated workers, given demographic trends, to meet the increasingly technical and demanding requirements of California industries.[3] In essence, the trends of industrial change and demographic change are converging in time, but diverging in direction. As a result, California may lose its competitive economic edge.

The state's internal weakness in producing college graduates compared to many other states is obscured by the fact that the state has been a net importer of people with college degrees from other states and countries. Of course, California should continue to welcome college-educated workers coming to the state, but should not count on that as a strategy.

Given the high cost of housing, barriers to immigration, and increasing opportunities in other states and countries for highly educated workers, it is risky for the state to depend on outside migration to meet its workforce demands. Furthermore, providing better opportunities for California residents – and especially our young people – to meet our future employment needs is both a practical and a valuable public policy goal.

RECOMMENDATIONS

California has enjoyed a half-century of economic leadership not only in the United States, but throughout the world. Maintaining this position – and our competitive edge – will require, at least in part, a sustained focus on higher education.

The following are major recommendations based on the study findings:

California leaders must view workforce needs as a critical driver in providing college opportunity and for assessing progress in meeting the state's higher education goals. These needs should be considered alongside social and educational goals and the availability of state funding. Public and private higher education institutions should be marshaled to meet this goal.

California community colleges and universities must produce both the *volume* of degrees needed, as well as the *match* of those degrees to expected workforce needs. State policy should focus on student preparation and awareness, as well as institutional capacity, to produce an adequate number of degrees and to meet priority needs.

California employers, business associations, labor unions and economic development agencies have a stake in ensuring the preparation of a highly educated workforce. These groups need to be engaged with educational institutions and policymakers at the regional and state level to ensure the preparation of California's workforce.

California must also address the workforce development needs for occupations not requiring college degrees or postsecondary vocational education. While these occupations were outside the scope of this study, these jobs will constitute a majority of employment and are also critical to the future health of the state economy.

METHODOLOGY

The report limits its projections out to the year 2022, the greatest time interval for which forecasts can reasonably be made for the economic variables analyzed, and the shortest time interval over which we can reasonably expect to make significant changes to the quality of California's workforce. This period represents a "window of opportunity" to

[3] *Public Policy Institute of California. "California 2025: Taking on the Future."*

Figure 4

Industry Employment for the Top 45 Occupations Requiring AAs and Postsecondary Vocational Education
Sorted by 2022 Employment

Industry Sector	Average Annual Employment		Percent Total Employment		% Growth
	2002	2022	2002	2022	2002-2022
Healthcare & Social Assistance	357,200	557,400	34.43%	36.81%	56.05%
Professional, Scientific, & Tech. Services	223,500	298,700	21.54%	19.73%	33.65%
Wholesale & Retail Trade	66,300	98,500	6.39%	6.50%	48.57%
Other Services (except Public Administration)	66,200	88,600	6.38%	5.85%	33.84%
Admin, Support, Waste Mgmt, & Remediation Srvcs	49,400	87,000	4.76%	5.75%	76.11%
Manufacturing	72,300	85,900	6.97%	5.67%	18.81%
Government (Public Administration)	67,700	84,500	6.53%	5.58%	24.82%
Arts, Entertainment, & Recreation	23,200	46,200	2.24%	3.05%	99.14%
Management of Companies & Enterprises	24,400	35,800	2.35%	2.36%	46.72%
Public & Private Educational Services	20,800	31,000	2.00%	2.05%	49.04%
Information	17,600	29,000	1.70%	1.92%	64.77%
Construction	11,800	17,800	1.14%	1.18%	50.85%
Accommodation & Food Services	11,400	16,000	1.10%	1.06%	40.35%
Real Estate, Rental, & Leasing	9,200	14,400	.089%	0.95%	56.52%
Transportation & Warehousing	7,900	11,900	0.76%	0.79%	50.63%
Finance & Insurance	7,700	10,700	.074%	0.71%	38.96%
Natural Resource and Mining	600	600	0.06%	0.04%	0.00%
Utilities	300	300	0.03%	0.02%	0.00%
Total Employment	1,037,500	1,514,300	100.00%	100.00%	45.96%

Sacramento State Applied Research Center, October 2005
Data Sources: California Employment Development Department, California Occupational Projections 2002-2012 and California Industry-Occupational Matrix 2002-2012¬
Note: Estimates for 2022 were calculated using a linear projection of the 2002 – 2012 change.
Based on analysis of the top 45 occupations requiring Associates degrees or postsecondary vocational education.

change trends which threaten the economic health and quality of life for California. Using two major foundations of existing data (occupational data and economic models), this study conducts new analysis of the relationship between occupations, education, and economic impacts on industries.

Education Specific Occupational Data: The report is built on a detailed analysis of U.S. Bureau of Labor Statistics (BLS) and California Employment Development Department (EDD) data on changes in occupation-education requirements and industry-occupation composition as reported by employers for the period 2002 through 2012.[4] The report extends those projections using a linear model through 2022, which assumes a continuation of the trends expected for the 2002-2012 period.

"Keeping California's Edge" includes a detailed economic analysis of the top 45 occupations requiring Associate Degrees, Bachelor's Degrees or graduate or professional degrees.[5] To develop a deeper view of industries and occupations dependent on community colleges, the study includes an additional analysis of the top 45 occupations requiring Associate Degrees or postsecondary vocational

[4] *BLS has undertaken vigorous analysis of factors underlying the changes being observed, including both the number of employees by occupation, as well as the changes in educational requirement for those occupations. The BLS methodology also includes the age-occupation dimension which allows analysis of the replacement of retiring workers.*

[5] *Any specific statistic that refers to higher education in this study generally relates to Associate Degrees, Bachelor's or higher, unless otherwise stated to specifically include postsecondary vocational education.*

education. The top occupations constitute the vast majority of occupations with these educational requirements and analysis of literally hundreds of additional occupations would have quickly diminishing returns.

Models of the Future California Economy: The report uses two models of the future California economy, one developed by the UCLA Forecast Project and one developed by the Employment Development Department, which anticipate both the growth in the economy as well as changes in the industry composition of the economy. In addition, the analysis applies a widely-used economic input-output model (called the Impact Analysis for Planning or the IMPLAN model) which shows the value of economic production, the effects on other industries which are suppliers or consumers of the products of the higher-educated workforce, the jobs which are created for employees in other occupations and industries, and the impact on local and state tax revenues.

The study reports value added economic impacts, which is a net measure of the value created over and above the cost of inputs. This measure is close to a measure of profitability or productivity, and the aggregate for all industries is the Gross State Product (GSP). The report aggregates direct, indirect and induced value added impacts.

The study applies the occupational analysis derived from BLS data to the UCLA and EDD economic forecasts using IMPLAN to understand the economic impacts of highly educated workers by industry.

While the study makes the use of the best available data, there are several limitations. First, it may not show areas where an employer may prefer, but not require, a higher level of education. Second, it may not adequately factor the accelerating pace of change and technology in the latter years of the analysis. Third, it can not account for changes in methods of production, including the mix of labor, technology, and capital, should a shortage of skilled workers actually occur.

Finally, there are several topics of interest that are outside the scope of this study. The study does not consider all California workforce development needs, nor does it consider all the positive economic impacts of higher education, for example, of research conducted by universities on the development of new industries. Furthermore, the study is a demand-oriented analysis. Topics related to the supply of college graduates or the appropriate content of their education are not a part of this study.

It is not possible to say how all these variables will affect the outcomes by 2022, but it is clear that the trends toward greater educational requirements will continue and will have serious impacts on key industries and economic sectors.

"If California fails to provide this workforce, the state's technical, education, health care, financial, manufacturing, and information sectors will have the most to lose."

CONCLUSION

California has a window of opportunity to prepare the highly educated workforce needed to maintain its position as an economic leader. Demand for highly educated workers is growing rapidly at exactly the time that large numbers of these workers will be retiring. If California fails to provide this workforce, the state's technical, education, health care, financial, manufacturing, and information sectors will have the most to lose.

About the Authors and Sponsors

For more information:
California Business Roundtable - www.cbrt.org

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This study was conducted by Robert Fountain, Ph.D. and Marcia Cosgrove, in collaboration with Petra Abraham, at the Applied Research Center, College of Continuing Studies, at the California State University, Sacramento. Dr. Fountain is a specialist in the area of economic impact analysis and has conducted research for a number of regional economic development agencies, employers, companies and others.

The California Business Roundtable is a membership association of the chief executive officers of major companies doing business in California. The Campaign for College Opportunity is a broad-based organization working to ensure access to college for California's growing college-age population as promised by the 1960 Master Plan for Higher Education.

Funding for this study was provided with grants to the Campaign for College Opportunity from State Farm Insurance, the California Wellness Foundation, the California Business Roundtable, and other sources.