



September
2007

Public Higher Education Performance Accountability Framework Report: Goal - Contributions to Economic, Civic, and Social Development Measure: Workforce Preparation — Degrees Awarded in Selected Areas of Projected Workforce Demand

This report is the third in a series of measure reports that examine the economic, civic, and social development of the state by its systems of higher education. This report measures degrees awarded in selected areas of employment against workforce demand.

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The Commission advises the Governor and the Legislature on higher education policy and fiscal issues. Its primary focus is to ensure that the State's educational resources are used effectively to provide Californians with postsecondary education opportunities. More information about the Commission is available at www.cpec.ca.gov.

Commission Report 07-17

Summary of Findings

Assessing the alignment of college graduation trends and the demand for college educated workers should be an integral part of any determination by the public and state policymakers as to how well California's postsecondary system is responding to the State's economic needs. This assessment must be at a relatively macro level both because precise data about college students and their workforce outcomes are not available and because state policy-making is primarily concerned with statewide impacts rather than regional economic shifts, at least at the present moment.

The following analysis contains insights into the nexus between postsecondary education and the State's workforce needs, including:

- For the bulk of jobs requiring college degrees the best measure of the adequacy of California's postsecondary investment is the extent to which employers must import degree holders to meet workforce needs and are forced to pay higher wages to college graduates in order to attract and retain them. California's employers have been importing college degree holders for several decades and offer among the highest wage rates for college graduates in the United States. There is also a growing population of under-educated workers in California's workforce. Employers and the State's economy would benefit if more workers could efficiently and effectively acquire postsecondary level educations.

- For most jobs requiring a college education, employers do not limit recruitment to applicants with occupation-aligned majors. While employers may give preference to applicants with degrees that require demonstrated acquisition of skills aligned to a profession, the educational attainment necessary for a liberal arts or general education is usually sufficient to meet new-hire needs in most occupations. The willingness of employers to recruit employees with degrees in majors that are not associated with particular occupations varies and is significantly impacted by the scarcity of college degree holders in majors associated with particular occupations.
- For certain occupations, employment requirements are tightly aligned with specific community college or baccalaureate degrees. Similarly, certain postgraduate degrees are tightly linked to holding certain jobs in California's economy. For these categories of jobs, the Commission was able to assess the alignment of graduate production and workforce needs. The Commission found:
 - California's postsecondary schools are not producing enough graduates with baccalaureate degrees to meet a growing demand by employers of workers with computer-related professional skills.
 - Overall there appears to be enough engineering degree graduates, but an increase in bachelor's degree level learners might help employers meet the need for entry-level workers.
 - State efforts to expand the number of college educated nurses, doctors and other health professionals appear to be helping to relieve shortages in these occupations. But California needs to maintain its commitment to such initiatives in order to avoid future labor shortages as the demand continues to grow for healthcare workers.
 - Workforce projections for attorneys suggest that the State's current capacity to train lawyers is adequate.
 - California continues to face serious shortages of fully qualified teachers. K-12 schools with the neediest students often lack the resources or incentives to attract fully qualified teachers, undercutting the ability of California to provide an adequate education to all students.
- The Commission has been able to assess the adequacy of college degree earning generally. Based on this assessment, the Commission concludes that California's postsecondary education system is not producing enough graduates to meet the State's economic needs. California's employers are forced to import college graduates and pay inflated wage premiums in order to attract and retain the college educated workforce they need. The Commission sees a need to continue and strengthen efforts to expand degree earning in several occupational fields including: computer-related jobs; engineering pro-

Public Higher Education Accountability Framework

The public's investment in higher education should be measured by outcomes. As the California's independent higher education planning and coordinating body, the Commission is in a unique position to assess performance without bias or conflict of interest. Under State law, the Commission is the only public agency with the data needed to assess student success across the University of California, California State University and California Community College systems. The Commission uses this data, coupled with other relevant State and national higher education data, to compile the performance assessment presented here. The Commission has put a priority on improving public confidence in the administration and delivery of public postsecondary education by increasing public knowledge of student outcomes, transparency of higher education decision making, and efficient achievement of the best educated and prepared workforce and population.

fessions; nursing and other health-related professions; and teaching. The Commission believes greater emphasis should be placed on tracking occupational outcomes for students and strongly supports linking student data-bases with employment-wage data maintained by the state and federal government.

Do Degrees Awarded Match Jobs Available

Between 1995 and 2000 California imported 224,000 bachelor's degree holders and 141,000 people with advanced degrees to fill jobs in California's booming economy. Several workforce assessments, most recently by the Public Policy Institute of California (PPIC), predict a growing demand for college graduates in California's economy. PPIC predicts that by 2025, 41% of all jobs in California will require a bachelor's degree or higher, compared to 31% today. This represents an increase of 3.5 million jobs for people with bachelor's degrees.¹

Because California's economy generates many more jobs that require baccalaureate degrees than the number of qualified degree holders in the State's workforce, California employers have turned to recruiting workers from outside the state. In some cases they move the work to other states or countries, but in many cases employers import degree holders to augment the supply of workers graduating from California's postsecondary institutions.

While census data shows how many college graduates California imported to meet its labor needs, there is a lack of data measuring how many professional level California jobs were exported through businesses moving away, expanding their jobs in other states or other countries, or simply outsourcing to companies in those areas.

What can or should California and its higher education system do about this situation? Is it a crisis? Or is it beneficial to encourage other states and countries to educate many of the professionals who populate our workforce? Should California be willing to let those jobs that employers cannot fill in California slip away to other states or other countries? The simple answer, at least to the export of jobs, is that jobs requiring baccalaureate or higher degrees are associated with higher pay and opportunities for advancement. To the extent policymakers can encourage employers to keep these jobs in California, the public and the State's economy will benefit.

One of the first steps in understanding the shortfall between degree output and jobs requiring degrees and determining whether it constitutes a problem is to ascertain its nature and magnitude. We know the approximate size of the overall shortfall in California's production of baccalaureate and higher graduates relative to the market demand for them, but we don't know how this shortfall is distributed among the various disciplinary fields and whether that matters. The short answer is that it doesn't matter how the shortfall is distributed across *most* college-level courses of study, but it does matter in a few critical areas.

General Skill Areas

Precisely matching the number of future college graduates in specific disciplines to the projected number of job openings requiring those disciplinary skills is an attractive proposition for manpower planners. Unfortunately for manpower planners, the rapidly changing nature of the State's economy, driven by shifting consumer preferences and the dynamic impacts of new technologies, disrupt efforts to project the exact need for future college graduates, particularly based on major or area of study. Fortu-

¹ Johnson, Hans P. & Reed, Deborah (2007) "Can California Import Enough College Graduates to Meet Workforce Needs?", *California Counts: Population Trends and Profiles*, v. 4., n.4.

nately for employers and students, the bulk of jobs requiring a community college or baccalaureate level degree and the essential elements for proficiency in many majors can be adapted to a wide variety of occupational needs.

For example, virtually all baccalaureate majors emphasize a core group of skills which prepare graduates for success in a broad spectrum of occupations. These skills include:

- Critical reasoning
- Problem solving
- Communication—oral and written
- And most importantly, the ability to learn specific procedures and skills quickly.

College administrators and faculty recognize the importance of these general skills for the future well-being of their graduates and work to make sure that these skills are incorporated in the general education requirements of college and university programs.

Graduates armed with four years of practice at these skills and who are experienced in learning new material and procedures can rapidly master specific skills required to successfully handle entry-level positions in a broad range of occupations. Companies seeking to expand their professional staff will advertise to a range of majors knowing that they can take advantage of the core skills embodied in the average college graduate by designing short-term, intensive training programs to impart the specific skills and knowledge needed to successfully do their job².

These three considerations—the imparted set of core college skills, the graduate’s ability to learn quickly, and an organization’s willingness to offer its own specific skill training programs—make it very difficult to match most college degrees with very specific occupations, though there are a few exceptions. To illustrate the general case, the Commission’s STEPS³ system relates a baccalaureate in political science or sociology to a host of occupations including: business operations specialist; compensation, benefits, and job analyst specialist; elementary school teacher; employment, recruitment, and placement specialist; market research analyst; operations research analyst; recreation worker; training and development specialist; among several others. Degrees in economics, psychology, business administration, mathematics and many other areas similarly qualify people for a wide range of entry-level, professional positions.

Consequently, for most baccalaureate programs, attempts to tightly align specific occupations to specific majors are not possible given the data currently available for analysis. There are simply too many cases where a specific major prepares a college graduate for success in a wide range of careers, and where a specific professional position can be successfully undertaken by college graduates from a fairly wide range of disciplines. This ability of most college majors to “cross-qualify” their graduates for a significant range of professional positions that overlap with the professional positions associated with other majors changes the question facing California legislators and higher education institutions. Nevertheless, the public, employers and state policymakers hunger for better data to assess the efficiency and effectiveness of public and private investments in postsecondary education. The key to better assessments is the collection and linkage of data concerning the immediate and long-term employment outcomes of postsecondary students.

² For a complete discussion of the value of general skills and model of general skills see the SCANS system at <http://wdr.doleta.gov/SCANS/>.

³ The School to Employment Pathways System (STEPS) was created by CPEC to show the links between program choice and occupation. It is available at <http://www.cpec.ca.gov>.

Because California currently lacks precise data showing how postsecondary learning supports occupational success, for most occupations policymakers are limited to measuring if the state's colleges and universities are producing enough college graduates to satisfy employer demand at the macro level. However, in certain occupations postsecondary education requirements are tightly tied to employment, and in these areas the nexus of college and employment can be assessed.

Specific Skill Areas

There are several critical California occupations that require technical skills that only a few college disciplines can satisfy. These include professional-level occupations in computer-related fields, engineering, nursing and other healthcare professions, and teaching. For these professional openings, we can investigate whether California universities and colleges are producing enough graduates.

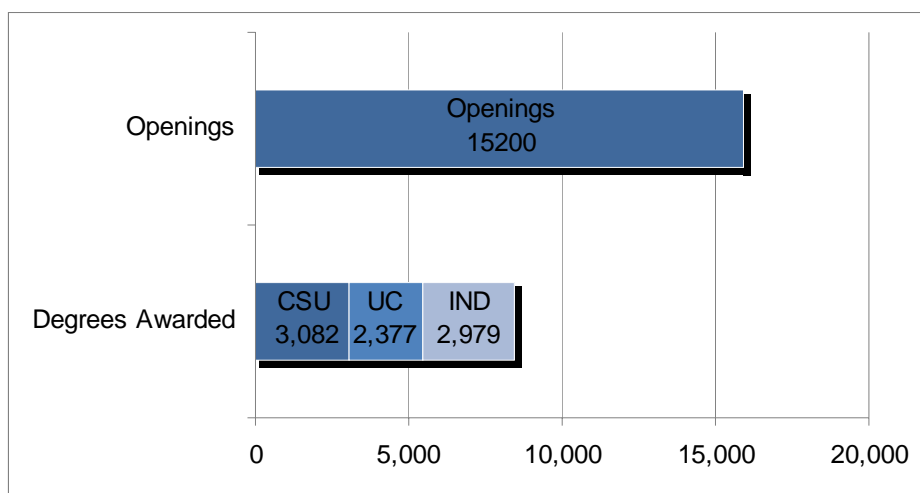
The following are selected areas where educational programs are so specialized that particular college degrees can be matched to specific jobs:

- Computer occupations
- Engineering occupations
- Nursing and healthcare occupations
- Lawyers
- Teachers

Computer-Related Professional Occupations

The demand for computer professionals is strong in California and cannot be satisfied by the new graduates from California's higher education institutions. In 2005, California's new openings approached 15,200 jobs, while graduates from the California State Universities (CSU), the University of California (UC), and independent colleges at the baccalaureate level and higher totaled just less than 8,600, a shortfall of nearly 6,600 graduates. This shortfall may be even more pronounced than the 8,600 figure suggests, since many of the 2,666 master's graduates and the 198 doctorate graduates included in this number already held baccalaureates in the field. These higher level graduates reduced the stock of baccalaureate degree holders available to work in the area. So, California's *net production of new degree holders* in computer fields actually may number less than 6,000 graduates.

Computer Occupations



Given the importance of the computer-related industry to the California economy, this shortfall of newly qualified graduates to fill new job openings is serious. California employers must recruit elsewhere and induce their new employees to move to California, a notably high-cost state; or may be tempted to relocate their activity requiring these employees to another state or even another country. These jobs pay very well and are exactly the type of jobs that California would like to retain. Moreover, the location of these computer-related jobs in California provides opportunities for other industries to serve these activities and to use their products. These related industries also tend to pay higher salaries and wages, which are the type of industries that benefit the California economy and provide attractive employment opportunities. Erosion of computer-linked employment in California threatens continued economic expansion in a number of California's industries and could hinder the State's ability to grow its economy.

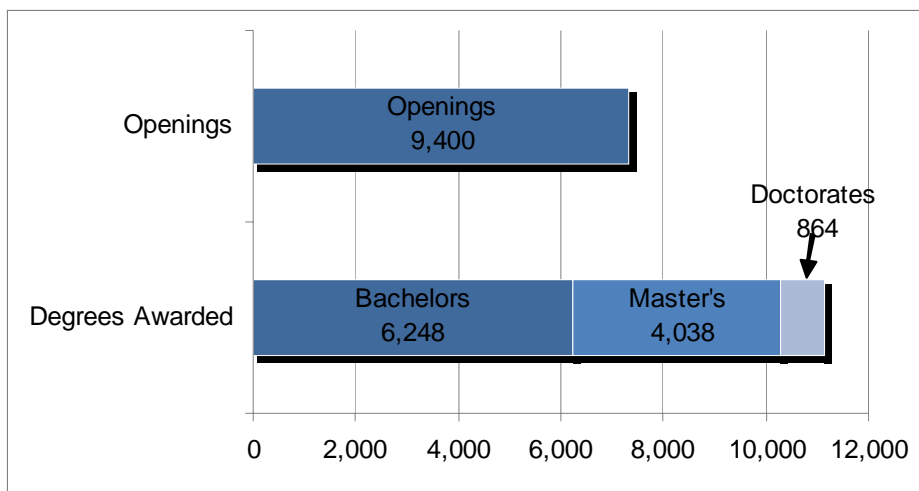
Engineering

Engineering professions in California might also be facing a shortfall of qualified candidates. Openings for engineers created by growth and people leaving the field totaled roughly over 9,400 in 2005, at the same time that California higher education institutions conferred 11,150 new degrees on bachelor, master, and doctorate candidates. It would seem there is an abundance of engineers to fill those positions. However, to the extent that the 4,038 master's candidates and the 864 doctorate candidates were already engineers with baccalaureate degrees working in California, many are already working as engineers and do not add to the supply of engineers available to fill an expanding number of new jobs. Counting only the people with baccalaureate engineering degrees as adding to the pool, we see about 6,250 new engineers in California, which falls far short of the 9,400 new jobs in the state.

Other externalities can affect labor market needs that come from major shifts in public policy. For example, the state's voters recently passed more than \$40 billion in infrastructure bonds to improve roads, buildings, bridges, levees, and waterways. It might be that the state will need many more structural and civil engineers to meet its workforce needs. Major shifts in public policy, such as the passage of large bond initiatives, can have an increasing effect on determining both additional capacity and output expected from the state's postsecondary institutions.

Further study is recommended for the engineering field to determine whether the students entering the master and doctorate programs are bachelor's degree holders educated or working in California. If they are, then, as indicated, the master and doctorate level graduates of California's institutions are enhancing the skills but not the numbers in the state's pool of professionally qualified engineers. But if our graduate programs are attracting candidates from outside the state or from other disciplines, then their graduates are adding to the numbers of professionally qualified engineers in California.

Engineers, Excluding Computer Engineers



Nursing and Other Healthcare Occupations

The shortage of nurses in California is nearly legendary and has commanded substantial legislative and administrative attention as special policies and programs have been put in place to close the gap between the nurses in the labor force and the demand for their services. The good news is that these extraordinary efforts have worked and the gap is nearly closed. The corollary, though, is that a number of the extraordinary efforts and policies will have to stay in place to prevent the gap from reopening.

California higher education institutions graduated just over 10,400 nurses⁴ in 2005, at the same time as the number of California job openings for nurses edged over 11,000⁵, leaving a shortfall of about 600 nurses. The recent special policies and incentives, and California's higher learning institutions' focus on this problem, have produced almost enough new nurses to fill the newly available jobs. However, those programs and efforts will have to continue into the future in order to sustain the near balance of supply and demand.

Further study is recommended to determine whether the number of graduates completing masters and doctorate programs in nursing are currently working in California or attracted from out of state. To the extent that these advanced degree graduates are already working in California, they do not represent new additions to the supply of nurses to fill projected vacancies and their numbers would increase the gap between supply and demand. Approximately 800 of the 2005 nursing graduates completed masters and doctoral level programs and their numbers would increase the gap between supply and available positions to 1,400. It is possible that as many as one-half of the masters and doctoral program graduates came from other states. Thus the more realistic estimate is that California's gap between supply and demand probably falls between 1,000 and 1,400 nurses.

As a side note, the number of medical doctors graduated in the state compares well with the number of job openings. Medical schools in the state graduated nearly 1,200 MDs in 2005 while openings totaled 920 statewide.

The demand for other healthcare workers has been growing at nearly the same rate as the demand for nurses because the same conditions (rising income, aging population, more focus on health) spur the demand for these workers. At present, California's higher education institutions are keeping up with the demand across this whole contingent of professionals by producing just over 6,100 graduates annually relative to just under 6,000 openings—essentially a balance. Within the broad category of other healthcare professionals, two areas bear further attention; these include pharmacists and physicians assistants.

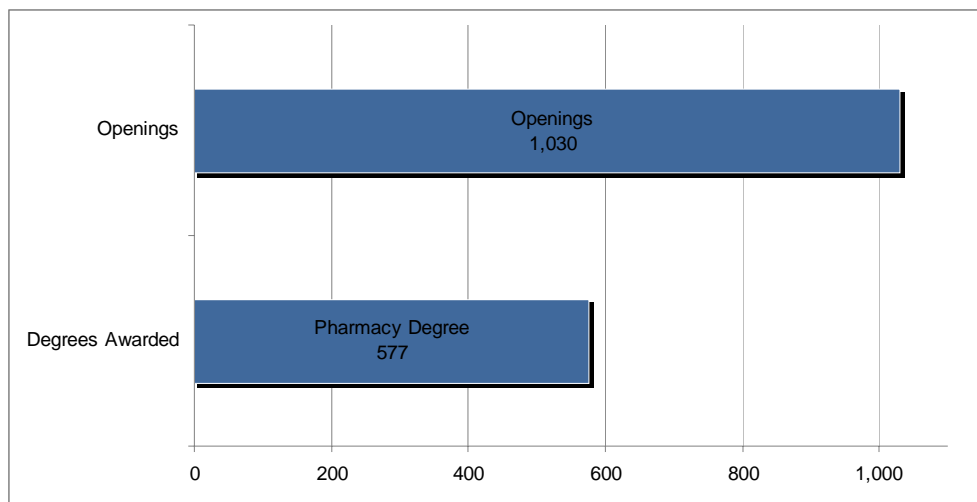
Job openings for pharmacists in California totaled 1,030 in 2005 while California pharmacy programs produced only 577 new pharmacists, a shortfall of over 400. These numbers indicate that it would take a major expansion of pharmacy programs to graduate enough pharmacists to satisfy the local demand for their services. The implications of this imbalance are not clear, which raises the question of whether some incentives or policies should be instituted to address this imbalance, or whether continuing to attract out-of-state pharmacists to fill these positions should be a concern.

A lesser imbalance exists for physicians assistants. In 2005, 310 positions for physicians' assistants opened in California while qualified graduates numbered only 164, a local shortfall of nearly 150 graduates. While 150 is a relatively small number, it would take nearly doubling the graduation rate of various programs that produce these graduates to balance the number of graduates to the number of openings. If that is a desirable end, some relatively major expansions would be required in the existing programs.

⁴ This number includes the following degrees: RN, ASN, BSN, MSN, MS and Ph.D.

⁵ This estimate is for registered nurses and post-secondary nursing instructors combined.

Pharmacists



Lawyers

The Commission, as part of its assessment of University of California, Irvine’s proposal for a new law school, conducted a sophisticated analysis of the supply and demand for lawyers now and in the future⁶. Estimating the supply and demand for lawyers is complex. As the Commission’s analysis shows there are many confounding variables. On the supply side, lawyers enter California from other states, and some lawyers don’t practice law. On the demand side, it is difficult to predict how changes in population and industry mix influence the demand for lawyers. Nevertheless, after a careful examination and analysis of census and labor market data, the Commission concluded that California had a more than adequate supply of lawyers. The study projected total annual openings for lawyers as 2,540 in 2010, and a projected supply of new law school graduates who are members of the bar at 4,052. The Commission projects this surplus to grow through 2014.

Teachers

California has a significant and persistent shortage of teachers. A number of legislative initiatives have been taken to streamline entry into the profession, support alternative routes to certification, and support new teachers. But the shortage persists. The shortage is found to be particularly acute in rapidly growing counties within the state and in schools with large proportion of African American and Latino students⁷.

⁶ California Postsecondary Education Commission (2007) *Review of a Proposal to Establish a School of Law at the University of California, Irvine*. http://www.cpec.ca.gov/Agendas/Agenda0703/Item_04.pdf.

⁷ For a complete analysis of the shortage and its impact on different geographic areas and fields and legislative efforts to solve the problem see: Guha, R., Campbell, A. Shields, P. Tiffany-Morales, J., & Wechsler, M. (2006) *California’s Teaching force 2006: Key Issues and Trends*. Santa Cruz, CA: The Center for the Future of Teaching and Learning.

Teacher Credential Awarded by Higher Education Sector 2005-06⁸

<i>SEGMENT</i>	<i>Type of Teaching Credential Issued</i>			
	Single Subject	Multiple Subject	Special Education	TOTAL
California State University				
First Time	915	2054	131	3,100
New Type	2,555	4,613	1,765	8,933
CSU TOTAL	3,470	6,667	1,896	12,033
University of California				
First Time	230	217	1	448
New Type	252	376	23	651
UC TOTAL	482	593	24	1,099
Private Institutions				
First Time	543	1,324	46	1,913
New Type	2,555	3,551	1,268	7,374
Private TOTAL	3,098	4,875	1,314	9,287
All Institutions				
First Time	1,688	3,595	178	5,461
New Type	5,362	8,540	3,056	16,958
TOTAL	7,050	12,135	3,234	22,419

The table above shows that 22,419 teacher credentials were awarded in 2005-2006, based on the recommendation of California higher education institutions. Most of these (16,958) went to recipients who already had so-called “new type” credentials. Many of these were issued to teachers who had been using emergency credentials; others went to people teaching in one field who received a credential to move to another field. Thus, the new supply of teachers is actually represented by the number of “first-time” credentials – 5,461. The table clearly indicates that the CSU is the primary producer of teachers, followed by the private and independent sector, and the UC playing a minor role.

On the demand side, EDD projects 20,540 annual openings for teachers between 2004 and 2014. These openings include 10,760 new openings and 9,780 replacement opening for people who leave the field

⁸ California Commission on Teacher Credentialing: A Report to the Legislature Eighth Annual Report 2005-06. Multiple Subject, Single Subject, and Special Education Internship Credentials Issued July 1, 2005 to June 30, 2006.

each year⁹. An annual survey of principals projects a slightly higher number of annual openings at 22,965¹⁰. Both of these projections anticipate the gap between “first time” credentials awarded and openings is at least 15,000 teachers annually.

An aging population of teachers suggests that demand will persist for the foreseeable future. The shortfall in the supply of teachers from California universities is made up by employing teachers who are “unprepared” or by credentialed teachers who have left the field and are returning or by attracting teachers from other states. The study cited earlier found that most of the shortfall is made up by employing “unprepared” teachers. “Unprepared” teachers are those who are not fully credentialed although they may be enrolled in a district or university intern program in which they teach while completing required course work; or they could be on emergency credentials or have credential requirements waived. The number of unprepared teachers peaked in 2001 at 42,427 statewide and had fallen to 17,839 in 2005-06.

Conclusion

Analysts agree that California has a significant shortfall of college graduates for the current and projected demand. A key role for CPEC is to continue to advocate for and suggest policies to expand the number of degrees awarded in the state.

Meeting the labor market demand involves not just producing degrees but ensuring that college graduates have the valued general skills that allow them to enter many occupations, learn quickly on the job, and adapt to change as it occurs. Thus CPEC should continue to focus on the quality of teaching and learning, recognizing that this is as important as increasing the number of degrees awarded.

The general skills and ability to learn allows college graduates to change occupations and learn new skills to keep up with change in the economy. It is critical that programs continue to emphasize these general skills that last a life time and are highly valued by employers.

Outside of a few occupations and degree programs, a precise planning method for matching the supply of graduates to the demands of the labor market is not currently possible. However, using labor market projections and census data the Commission has been able to assess the adequacy of college degree earning generally. Based on this assessment, the Commission concludes that California’s postsecondary education system is not producing enough graduates to meet the State’s economic needs. California’s employers are forced to import college graduates and pay inflated wage premiums in order to attract and retain the college educated workforce they need. In occupational areas where the alignment of degree earning and work force need can be assessed, the Commission sees a need to continue and strengthen efforts to expand degree earning. Several occupational fields where degree expansion is warranted include: computer related degrees; engineering; nursing and health related professions; and, teaching. Lastly, the Commission believes greater emphasis should be placed on tracking occupational outcomes for students and strongly supports linking student data-bases with employment-wage data maintained by the state and federal government.

Given the dynamism of the economy and the fact that a single degree can lead to many occupations and a single occupation may be filled by people with many different degrees, the Commission believes data reporting and assessment tools such as its STEPS Internet reporting system are needed to provide students, campus and employers with enrollment, graduation and labor market information useful for tight-

⁹ *California Employment Projections 2004-2014* Source: Employment Development Department Labor Market Information Division (SOC Code 25-2000)

¹⁰ Yearly report by CBEDS. Principals self-report their expected need for new and replacement teachers for the following year. Source: CDE Dataquest

ening the alignment of postsecondary education and workforce outcomes. Because resources tend to follow enrollments in higher education, if students choose disciplines that lead to jobs in growing sectors of the economy, over time investments in higher education will align with the labor market. Similarly, if campus and system planners have ready access to good data about labor market trends and degrees awarded by other institutions and use this data to inform their own planning and investment, alignment with the labor market should improve over time.

