The Research and Planning Group of CA Community Colleges’ Center for Student Success is currently engaged in the Career and Technical Education (CTE) Transfer Research Project. This study aims to assess the state of transfer between community colleges and four-year institutions for CTE students (2/4 CTE transfer) and document factors that inhibit and support such transfer. Studies conducted by several organizations and initiatives present an urgent economic and workforce need to close the gap between the growing number of positions that demand baccalaureate-level preparation and the number of individuals available to fill them.

Most recently, the Public Policy Institute of California (PPIC) released a series of reports projecting a significant shortage by 2025 in the supply of college-educated workers versus the demand for those workers by employers. Specifically, PPIC predicts that by 2025, the labor market demand for college-educated workers in CA will be as high as 41% while only 33% of the population will possess a baccalaureate degree (Reed, 2008). PPIC and other researchers conclude that this gap presents a significant economic challenge to the state that will require a response from educators, policy makers, funders and employers alike.

This document summarizes the CTE Transfer Research team’s efforts to better understand which specific industries and occupations in California project a need for workers with four-year degrees. This information will guide the study’s related investigation of how the state’s community colleges currently work to transfer students in related disciplines and what can be done to increase student transitions to bachelor-level preparation for high-demand, high-growth occupations. The team undertook a two-part examination of workforce trends. First, the team performed a review of three different sources of occupational employment projections for openings requiring baccalaureate-level preparation. These source included: (1) the Employment Development Department’s (EDD) long-term occupational projections; (2) the California Regional Economies Project (CREP) analysis of key industry clusters with EDD projections of related employment trends; and (3) the Occupational Supply Demand System (OSDS), a tool that combines labor market projections in individual occupational disciplines with information about the number of individuals who are completing educational programs that prepare them to enter these occupations.

Second, the team engaged in interviews with key labor market experts and researchers including representatives from EDD’s Labor Market Division, the Public Policy Institute of California and the Campaign for College Opportunity. The abovementioned sources use trend data to make future predictions of labor market demand and workforce supply. EDD projections and other
information used in this document were gathered before the recession that began with the Fall 2008 economic crisis. Given the retroactive nature of these sources and the current volatility of our national and state economy, a great deal of uncertainty surrounds these forecasts. To supplement this labor market data, the team asked these representatives to consider how the economic downturn is likely to impact the state’s demand for baccalaureate holders in years to come. Their responses are summarized at the end of this document.

**Projections for Occupations Requiring Baccalaureate Degrees**

A few key concepts assist in interpreting the following labor market projections for baccalaureate-trained workers. First, labor market data can be viewed from the perspective of employers who need workers (demand side) or from the viewpoint of the prospective workers available (supply side) for a given occupation. Labor market demand data is based both on the number of new jobs expected for a given occupation (growth) as well as the number workers required due to separations (replacements) for a defined period of time. Separations are often due to retirements. Perspectives I (EDD) and II (CREP) described below look at the expected demand for workers in a range of occupations; Perspective III (OSDS) combines demand and supply information. Finally, the research team underscores that all data presented here summarizes long-term occupational forecasts rather than short-term trends which tend to be less stable, particularly in the current economic climate.

**Perspective I: Employment Development Department’s Long-Term Occupational Projections**

In June 2008, EDD projected that 6.3 million job openings will be added to the state’s economy between 2006 and 2016, including 2.5 million new jobs resulting from industry growth. It was projected that 15% of these jobs will require bachelor’s degree preparation; 4% associate degree level preparation; and 4% post-secondary vocational education. This translates into 92,600 job openings per year requiring bachelor-level preparation; 25,300 requiring associate degree-level preparation; and 25,300 requiring post-secondary occupational education. These EDD projections are the primary source of labor market data used by economic, workforce and education researchers and policy analysts throughout the state.

Chart 1 depicts the five occupations projected by EDD to generate the largest number of job openings requiring baccalaureate-level preparation when new jobs and net replacements are combined. These include two jobs in computer and information systems, two in teaching, and one in accounting and auditing. The research team added registered nursing because it is projected to generate more high-skill, high-wage jobs than any other occupational category and because candidates for these openings include both associate- and baccalaureate-degree holders.
In registered nursing, it is estimated that 56% of openings will result from new job growth while the remaining 44% will be replacements. In computer software, a higher share of job openings (73%) is projected to be new growth. In teaching, the share of new growth is 43% for secondary school and 48% for elementary school teachers.

Chart 2 (p. 4) focuses specifically on new job creation projected for 2006-2016, depicting the fastest-growing occupations that will require baccalaureate-level preparation. The 13 occupations included in the chart are those projected to generate more than 5,000 new jobs over this ten-year period, or more than 500 new jobs per year.

Five of the 13 fastest growing jobs requiring baccalaureate-level preparation are computer-related, including the top two generators of new jobs: computer software engineers specializing in applications and network systems and data communications analysts. The three other computer-related jobs included among the fastest growing occupations requiring baccalaureate-level preparation are: network and computer systems administrators, computer software engineers specializing in systems software and computer systems analysts.

The other occupational category that dominates the chart is teaching, also with five different job categories among those projecting the fastest growth. The type of teaching required spans from graduate teaching assistants to kindergarten teachers, with the former and special education teachers projecting the fastest growth at more than 30% each over the 2006-2016 period.
Overall then, computer- and teaching-related jobs occupy ten of the 13 fastest growing occupational disciplines requiring baccalaureate-level preparation. The other three occupational disciplines on the chart are multi-media artists and animators, industrial engineers and financial analysts.

**Chart 2: Rate of Increase Projected for Fastest-Growing Occupations Requiring a Bachelor’s Degree**

![Chart 2](chart2.png)

*California Employment Development Department, Projections of Employment by Industry & Occupation, 2008*

Chart 3 (p. 5) translates the growth rate presented in Chart 2 into absolute numbers, revealing that although computer-related jobs are projected to have the fastest rate of growth, the largest number of new jobs requiring baccalaureate-level preparation are expected to be in elementary school teaching. Nevertheless, the sum total of new jobs expected to be generated by the five fastest growing computer-related occupations exceeds the combined number projected for the five fastest growing teaching occupations.

If jobs requiring associate degree and certificate-level preparation are included, a large number of health-related professions are added to the list. These include veterinary technologists and technicians (40% growth projected between 2006-2016), home health aides (39%), pharmacy technicians (36%), dental hygienists (36%), dental assistants (35%), and registered nurses (25%). Among the healthcare-related occupations, the largest number of new jobs will be generated in nursing (59,600) followed by medical assisting (18,200), dental assisting (16,900) and licensed vocational nursing (11,200).
Another perspective on job growth is through what the California Regional Economies Project (CREP) calls key industry clusters. CREP’s analysis of industry clusters takes its point of departure in a view of California as comprised of a series of regional economies with individual characteristics and opportunities. Each of these regional economies has both traditional and expanded economic base industries that indicate future growth. During the past five years, this bi-partisan research initiative has completed a series of analyses of both “population serving” sectors such as health care and construction as well as those that show the potential for strong future expansion such as biotechnology. CREP has performed additional in-depth studies focusing on California’s manufacturing value chain (design, production and logistics) and on clean technology and the green economy.

CREP’s analysis examines the following industry clusters for their potential to generate high-skill employment and economic growth (California Workforce Investment Board, 2007). It also utilizes EDD data to project the types of related occupations that will be in demand. The

---

1 The California Regional Economies Project is the research arm of the California Economic Strategy Panel. Appointed by the Governor and the leaders of the California legislature, the Panel studies the state’s economy to “develop a statewide vision and strategic initiatives to guide public policy decisions for economic growth and competitiveness” (Maglinte, 2008).
following industry clusters are highlighted for their inclusion of occupations that will require both two- and four-year training.\(^2\) Note that some clusters involve emerging industries for which descriptive occupational information is still limited.

- **Biotechnology**: includes occupations across seven major categories such as research and development, manufacturing and production, information systems and sales. Bioinformation specialists, medical scientists, veterinary technologists and technicians and biological technicians show strong growth.

- **Information Technology**: includes computer software engineers, computer systems analysts and computer support specialists, which are expected to account for two-thirds of new IT jobs. Other high-growth occupations in this cluster include network systems and data communications analysts and administrators, computer and information systems managers, computer specialists, computer hardware engineers and computer programmers. While California has more IT workers employed in the IT sector itself than most other states, most IT workers are employed by non-IT companies and the availability of these workers will be vital to their productivity and growth.

- **Manufacturing and Logistics**: includes computer software engineers, industrial engineers and engineering managers. The industry will continue to show weakness in the production part of the manufacturing value chain, while design and distribution-related manufacturing employment expect the greatest growth. While many of the occupations projecting the largest employment growth generate jobs that require less than an associate degree, CREP estimates that 40% of high-growth occupations in manufacturing will require baccalaureate-level preparation.

- **Health Sciences and Services**: includes nursing as the only occupation requiring an associate or baccalaureate degree out of the top five high-growth occupations in this cluster. This industry cluster expects rapid growth in jobs attainable with an associate degree, including dental hygienist, pharmacy technician, licensed vocational nursing and medical assisting.

- **Construction**: indicates possible growth for engineers and operations and construction managers. While the mortgage crisis has sent the residential and much of the private commercial part of the industry into a tailspin, recent economic stimulus dollars show significant government investment in infrastructure and other public works projects (see p. 9 for further information). As a result, the industry may generate high-skill jobs in engineering and management.

- **Geospatial technologies**: includes computer software engineers, database administrators and industrial, mechanical, electrical, environmental and aerospace engineers. Geospatial technology-related occupations are expected to grow much faster than the average and projected to add 100,000 jobs across related industries. This is also an industry that anticipates growth due to government investments in infrastructure, transportation and public works.

---

2 Other industry clusters include Automotive, Energy, Financial Services, Hospitality, Retail and Transportation.
Clean Technology and the Green Economy: includes jobs related professional, scientific and technical services. Most jobs at this time are in energy generation and distribution. An estimated 53% of jobs relate to solar energy generation. Manufacturing jobs account for more than 40% of employment while professional, scientific and technical services generate 28% of employment. The latter category is more likely to generate high-skill jobs, particularly in engineering, computer and information technology, sales and management occupations.

Perspective III: Supply and Demand Indicators

Yet another perspective is provided by the Occupational Supply Demand System (OSDS), developed by Georgia State University with support from the Department of Labor. The tool combines information about job openings with information about students who are enrolled in or completing programs that prepare them for these openings. The system pulls labor market information from national and state labor agencies and educational completion data from the National Center for Educational Statistics (NCES). Using the OSDS, users can compare the demand for an occupation with the current and future supply of workers based on completion rates for particular disciplines.

As an example, using the California EDD projections referenced in Perspective I, the OSDA projects that between 2004 and 2014, California will have 8,350 openings in computer engineering each year, including 6,630 new jobs (79%) and 1,720 replacements (21%). Turning to the OSDA’s supply-level information, the resource lists 35 educational institutions offering 53 educational programs in California that prepare students for these jobs. In 2006-07, the OSDA indicates that 1,261 students completed these programs—many fewer than the number of qualified workers needed to fill the 8,350 new openings generated by the industry. Using the OSDA, it is also possible to identify the number of completers by educational institutions. As an example, it can be determined that Cal State University Long Beach and Cal Polytechnic State University San Louis lead the field with the largest number of graduates.

For the discipline of accounting, the OSDA projects that California will have 5,330 openings per year between 2004 and 2014 and that 55% of these will be generated by separations. The OSDA reports that 1,142 baccalaureate degrees in accounting were awarded in 2006-07 with the largest number of graduates generated at University of Southern California (253) followed by Cal State Northridge (187) and University of Phoenix (101). The same year, 1,198 Associate Degrees in accounting were conferred with College of the Canyons (80) and Sacramento City College (59) identified as top producers.

While the OSODS is a promising tool, the EDD cautions that it has limitations and that there are discrepancies between information presented by OSDS and alternative data sources. Further, by considering each state as a closed system, OSDS does not take into account that the labor pool for some jobs is national or even international. Using the example above, while only 1,261 individuals in the state of California obtained the requirements to fill the 8,350 new job openings in computer engineering, candidates from outside of the state may contribute to close the gap between the demand and supply for skilled labor in this discipline.

3 http://www.occsupplydemand.org
For the purpose of this study, however, the OSDS is a useful tool for painting a preliminary big picture of the relationship between the demand and supply for labor in key occupational disciplines and for examining which baccalaureate institutions play key roles in preparing students for careers in these disciplines. It is also useful to track the community colleges that confer relatively large numbers of associate degrees in each field of study and to determine whether these are also the institutions that generate the largest number of transfers in these disciplines.

**Supplemental Information on Employment Projections: Expert Input and the American Reinvestment and Recovery Act**

As discussed, EDD released the data used in this analysis in Fall 2008. Since then, the economic outlook has darkened and some analysts believe that the current recession will be deeper and much more serious than anything the country has experienced for many decades. Because of this situation, the research team asked labor market experts and key researchers to consider the possible impact that the economic downturn might have on the forecasts presented in this brief, including the California Economic Development Department’s projections for labor market trends.

In January 2009, the research team conducted a conference call with several EDD representatives including lead economists and researchers with the agency’s Labor Market division. EDD’s experts conveyed that the overall trends presented are expected to hold, despite the recession. EDD reiterated the long-term nature of its labor market projections and underscored that in its estimation, the industries and related occupations identified as high-demand and high-growth would not fundamentally transform as a result of the current crisis.

Experts from the Public Policy Institute of California interviewed in January 2009 share this opinion. They also advised that the current downturn is unlikely to change the PPIC forecast which warns of serious and statewide shortage in baccalaureate holders that will deepen over the next decades. PPIC first presented this warning in 2005 and recently underscored the debilitating impact that these projected shortages will have on California’s economic future (Reed & Johnson, 2007).

PPIC highlights that the increase in demand for college-degree holders has and will continue to outpace the increase in supply of these workers (Reed, 2008). According to the PPIC, key changes in the state’s demographics are projected to significantly reduce the supply of baccalaureate holders including the retirement of well-educated baby boomers, insufficient migration to the state and the low number of Latinos earning four-year degrees. PPIC also cites employers’ preference for hiring employees with baccalaureates even for jobs that do not require this level of preparation, noting the premium employers pay these individuals for filling such positions. PPIC combines these factors to predict that by 2025, 41% of California’s labor force will need baccalaureate-level training to meet workforce demands and to support economic growth while only 33% of the population will possess this level of preparation.

Conversations conducted with the Campaign for College Opportunity (CCO) in March and April 2009 emphasize the need to produce more baccalaureate holders in California particularly in the science, technology, engineering and mathematics (STEM) disciplines. A forthcoming report
commissioned by CCO demonstrates that the supply of workers skilled in STEM disciplines is significantly outpaced by employer demand for these workers. It notes that for STEM occupations projecting shortages, approximately one-third require a bachelor’s degree while another third require associate-level preparation. The Health Care and Social Services and Professional, Scientific and Technical Services sectors are expected to be most impacted by these shortages. Again, using EDD data, the report cites computer software engineers, accountants/auditors, computer systems analysts, industrial engineers and medical lab technologists as those high-demand occupations requiring baccalaureate preparation.

Finally, one significant new development in the state’s current economic and workforce landscape is the passage of the American Reinvestment and Recovery Act. According to the California Economic Recovery web portal[^41], the state reports an influx of $85 billion in stimulus funding across ten investment categories including Health and Human Services ($19.5 billion), Education ($11.8 billion), Transportation ($4.7 billion), Energy ($3 billion), Water and Environment ($2.5 billion) and Science and Technology ($2.4 billion). While distribution of these funds is evolving rapidly, these investments are likely to have the most relevance to occupations requiring baccalaureate training in areas of education, engineering, design, management and computer and information technology.

With a particular focus on green and clean technology, statewide efforts have been mobilized through the EDD and Workforce Investment System to produce a swift workforce training response to this stimulus funding. These initiatives include mapping of emerging occupations and related training across a broad range of green industry segments such as energy generation, efficiency and storage, transportation, green building, business services and research. A recent publication by the Environmental Defense Fund identifying 200 green jobs in California indicates that many emerging occupations that both expect growth and require four-year preparation also tie back to STEM disciplines.

**Conclusion**

Trend data indicates that California needs to accelerate its production of baccalaureate-prepared workers in several high-demand and high-growth occupations and that failure to do so could compromise the state’s workforce needs and economic growth opportunities. Both the PPIC and CCO emphasize in their reports the significant stake community colleges have in the education of this workforce. In a June 2009 report, PPIC notes that more than 70% of California’s college students attend community colleges and that over half of all bachelor’s degrees awarded by CSUs and over a quarter awarded by the UC system are conferred to community college transfer students (Johnson, 2009). Moreover, while only a relatively small number of community college students transfer, those who make this transition demonstrate high completion rates. The authors conclude that boosting transfer rates could significantly increase the number of students who earn bachelor’s degrees.

In the next phase of this project, the research team will investigate CTE programs that prepare students for occupations showing the largest number of openings, those that correspond with emerging industries (as noted by CREP and related to statewide efforts to promote green and

[^41]: [http://www.recovery.ca.gov/](http://www.recovery.ca.gov/)
clean technologies) and those occupations expected to have the fastest growth. The team will specifically examine enrollments and transfer in the following CTE program areas as defined in the California Community College Taxonomy of Programs (TOP):

- Environmental Science (03)
- Biological Science (04)
- Business and Management (05)
- Information Technology (07)
- Education (08)
- Engineering and Industrial Technology (09)
- Health (12)
- Law (14)
- Public and Protective Services (21)

Eva Schiorring (Senior Researcher) and Kelley Karandjeff (Researcher) compiled occupational projections summary for the RP Group’s Center for Student Success. For more information on and publications produced by the CTE Transfer Research Project, visit http://www.rpgroup.org/css/CTETransfer.html.

---

References


