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Career Technical Education

Reducing Wage Inequality and Sustaining California's Innovation-Based Economy

Ross DeVol

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ABOUT THE MILKEN INSTITUTE

The Milken Institute is a nonprofit, nonpartisan think tank determined to increase global prosperity by advancing collaborative solutions that widen access to capital, create jobs and improve health. We do this through independent, data-driven research, action-oriented meetings and meaningful policy initiatives.

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Introduction

Income distribution in the U.S. and California has become far less equal since about 1980. Much of the rising disparity appears to be the result of increasing returns on capital assets relative to labor earnings (Piketty, 2014[1]). This is reflected in the widening of wealth inequality more than income, but will likely initiate a negative feedback loop in which income inequality rises in the future.

Many other causes of the increase in income (wage) disparity have been proposed: Globalization has exposed low-skilled U.S. workers to foreign competition from Asia and other emerging economies; technological change has placed a greater value on highly skilled workers, lifting their wages relative to lower-skilled workers; institutional changes, such as the weakening of private-sector unions, have reduced workers' bargaining power; the inflation-adjusted minimum wage has declined; and the number of less-educated immigrants in the workforce has grown.[2]

This list is not exhaustive, as many believe that financial deepening, measured by private credit in proportion to GDP[3], accompanied by relatively less financial inclusion, has exacerbated inequality.

This analysis examines the role that skill acquisition, as measured by academic degrees obtained or average years of education, has played in rising wage inequality and how the gap can be narrowed by increasing opportunities for postsecondary career technical training. The difference in earnings for workers who receive postsecondary education compared with those with only high school education or less has widened over the past few decades. The magnitude of contributions from various sources may be debated, but the combined impact has been to reward workers who have higher skills. Career technical training will also help support California's innovation-driven industries, where there are shortages of professionals in mid-level occupations.

1. See Thomas Piketty, *Capital in the 21st Century*, (President and Fellows of Harvard College, U.S., 2014).
2. Era Dabla-Norris, Kalpana Kochhar, Nujin Suphaphiphat, Frantisek Ricka, and Evridiki Tsounta, "Causes and Consequences of Income Inequality: A Global Perspective," International Monetary Fund staff discussion note, June 2015, pp. 1-39.
3. Jesper Roine, Jonas Vlachos, and Daniel Waldenstrom, "The Long-Run Determinants of Inequality: What Can We Learn from Top Income Data?" *Journal of Public Economics* 93 (7/8): pp. 947-88.

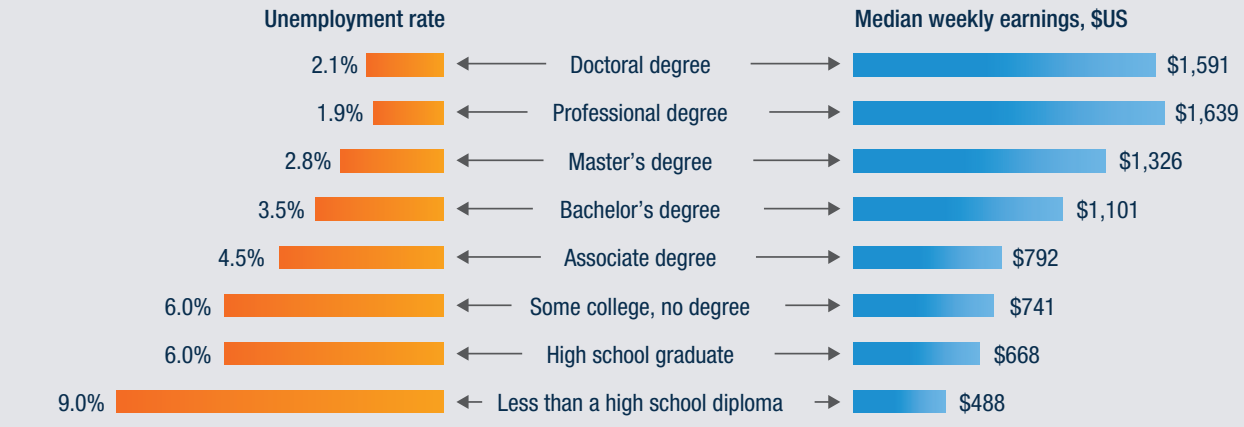
Educational Attainment, Wages and Regional Prosperity

In 1979, the premium of having attended college or obtained an associate degree, compared to less than a high school education, was 34.3 percent, as measured by median weekly earnings in 2014 dollars of people 25 or older.[4] By 2014, that same premium had widened to 55.9 percent. In 1979, the median earnings of individuals with a bachelor's degree or higher were 63.9 percent higher than those without a high school degree. In 2014, the premium had jumped to 144.4 percent.

An important study on the college premium was conducted by Daron Acemoglu and David Autor.[5] They concluded that in 2008, the average college graduate earned 97 percent more than the average high school graduate with no college. In other words, college graduates on average earned twice as much as those who didn't attend college. This gap is the widest since comparable wage data became available in the early 20th century and is probably the widest in history.[6] The authors also examined the various factors contributing to the widening differential. Another study found that California had the widest college premium of any state.[7]

The most recent data (2014) on education, earnings, and unemployment rates demonstrate the degree of the disparity (see Figure 1). The median weekly earnings of an associate degree holder were $792, compared with $488 for someone without a high school diploma. The unemployment rate for those with an associate degree was 4.5 percent, vs. versus 9.0 percent for those with less than high school. Those with lower skills are more loosely attached to the labor force. The size of the unemployment rate gap varies over the business cycle but remains elevated for those with less than high school.

FIGURE 1 Unemployment and earnings for workers 25 and older by educational attainment (2014)



Source: U.S. Bureau of Labor Statistics

4. http://www.bls.gov/opub/ted/2015/more-education-still-means-more-pay-in-2014.htm (accessed March 16, 2016).
5. Daron Acemoglu and David Autor, "Skills, Tasks and Technologies: Implications for Employment and Earnings," *NBER Working Paper No. 16082*, 2010, p. 7.
6. John Etchemendy, "Are Our Colleges and Universities Failing Us?" Carnegie Corporation of New York, http://higheredreporter.carnegie.org/are-our-colleges-and-universities-failing-us/ (accessed March 23, 2016.)
7. Katie Zaback, Andy Carlson, and Matt Crellin, "The Economic Benefit of Postsecondary Degrees: A State and National Level Analysis," State Higher Education Officers Association, 2012.

Regional and Individual Payoff

The Milken Institute has conducted numerous studies demonstrating the returns to investment in human capital. Our 2013 study, "A Matter of Degrees: The Effect of Educational Attainment on Regional Economic Prosperity,"[8] provides the strongest evidence that not only do individuals with higher skills reap the wage premium reward, but that communities and regions share in it as well.

To learn how the dynamics of human capital are changing the paradigm of regional economic performance, we developed a data set of educational attainment among the workforce in U.S. metropolitan areas, broken out by occupation, for 1990, 2000, and 2010. We used this data set to examine many facets of the statistical relationships linking the educational achievement of the workforce, a region's occupational and industry composition, and overall regional economic prosperity, measured as real GDP per capita and real wages per worker.

Among U.S. metropolitan areas, the disparity of real wages per capita and real GDP per capita are extreme. The mean average educational attainment for the top 10 metros was 14.52 years, vs. 12.27 years for the bottom 10.

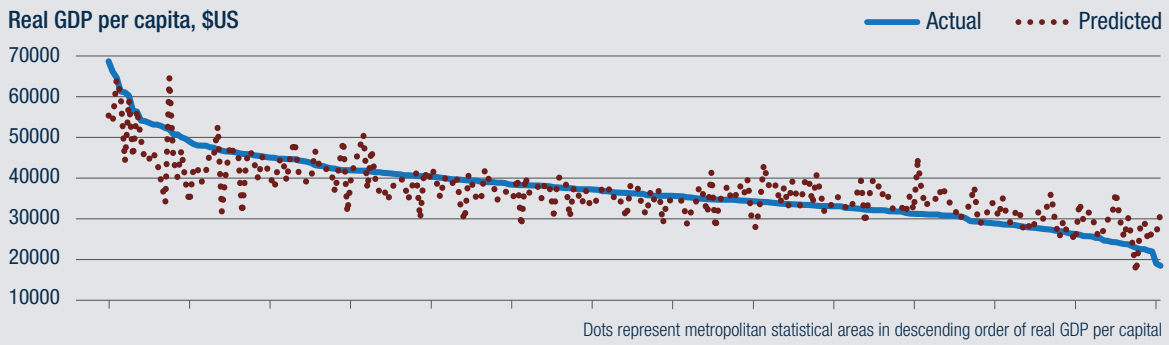
Furthermore, real GDP per capita among the top 10 was $52,330, vs. $36,130 for the bottom 10. This variance of $16,200 is was no coincidence; it is consistent with the pattern of educational attainment.

While the patterns above provide circumstantial evidence that educational attainment and regional economic prosperity are correlated, they are not a smoking gun. To measure the direct relationship between the two, we conducted a series of regression analyses based on the conceptual framework of a production function.

A production function describes how factor inputs (typically including labor and physical capital) translate to production output (measured as real GDP per capita). It takes into account the age composition of the workforce, industry mix, R&D intensity as measured by patents per capita, and other structural differences. This approach assumes that each worker is embodied with different units of labor inputs, and the difference is related to his or her years of schooling. The analysis permits us to estimate the marginal rate of return of an additional year of schooling to the regional economy.

The result? The overall explanatory power of the relationship is strong and robust. Over 70 percent of the variation in real GDP per capita across the 261 metros from 1990 to 2010 is explained. Figure 2 displays the actual vs. predicted values from the equation for 2010, providing a visual perspective of the relationship. Similar results were found for real wages per worker. All the economic factors are significant.

FIGURE 2 Real GDP per capita of U.S. metros, 2010 (actual vs. predicted)



Source: Salary Surfer, 112 California Community Colleges

8. Ross C. DeVol, I-Ling Shen, Armen Bedroussian, and Nan Zhang, "A Matter of Degrees: The Effect of Educational Attainment on Regional Economic Prosperity," *Research Report*, Milken Institute, 2013.

Key Findings

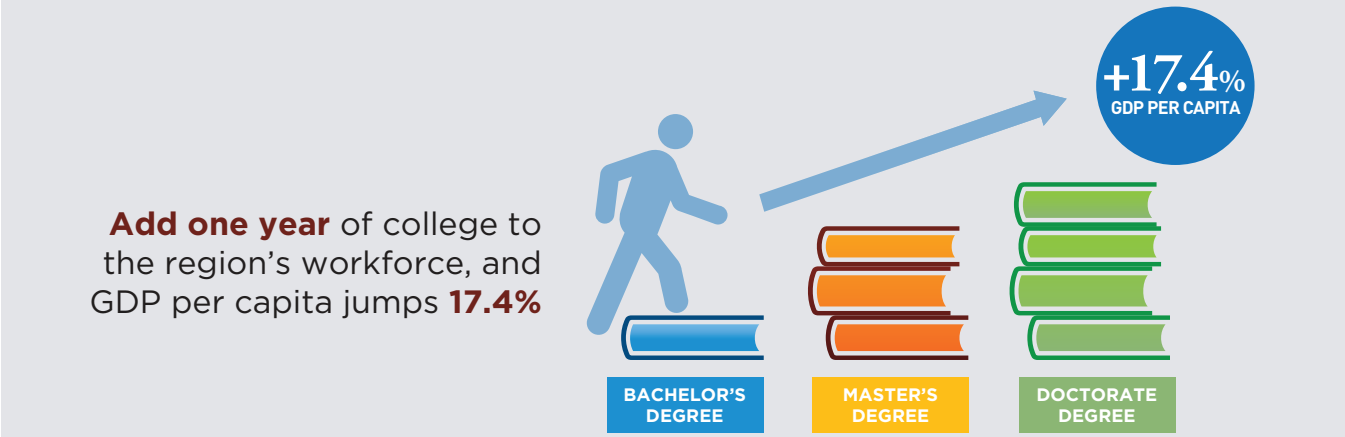
Our analysis clearly demonstrates that a region's economic fortunes are tied closely to the education level of its workforce. Our major findings are:

Education increases regional prosperity: Adding one extra year to the average years of schooling among the employed in a metropolitan area is associated with an increase in real wages per worker of 8.4 percent and an increase in real GDP per capita of 10.5 percent. Take the Los Angeles-Long Beach-Santa Ana metro in California, for example. If the employed labor force had the same average number of years of schooling as the Washington-Arlington-Alexandria area surrounding the nation's capital, real GDP per capita in 2010 would increase to $59,428 from $51,959. Alternatively, real GDP per capita would jump 20 percent.

Better education, bigger benefits: The benefits of additional schooling for regional economies are even greater for better-educated workers. *Adding one year of schooling to the average educational attainment among employed workers with at least a high school diploma is associated with an increase in real wages per worker of 17.8 percent and an increase in real GDP per capita of 17.4 percent*. (See Figure 3). In other words, if everyone with a high school degree went on to obtain an associate degree, real wages in an entire region would jump by 35.6 percent. In contrast, an additional year of education for workers with just nine or 10 years of schooling has little effect on real GDP per capita and real wages per worker. This finding accentuates the importance of investing in postsecondary education.

Economic growth is largely dependent on developing and maintaining a well-educated workforce with the skills that industries require. Whether it is a city, county, metropolitan area, state, or nation, high levels of skilled human capital and continuing investment in education protect a location from being arbitraged by those seeking lower costs in an interconnected world. And human capital is not subject to the laws of diminishing returns: As educational inputs increase, economic output per capita rises more than proportionately. Additionally, individuals in locations with highly educated populations become more productive and earn higher wages than those with the same educational attainment in locations with less-educated workforces. In other words, as others obtain more education around you, not only do their wages rise, but yours do as well. There are significant positive spillover economic effects from incremental gains in upgrading skills beyond those of high school graduates.

FIGURE 3 Relationship between regional GDP and average educational attainment of employed workers



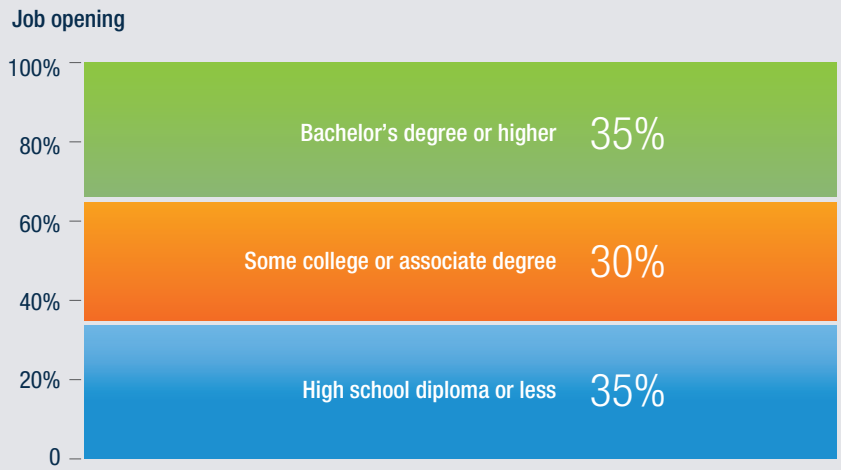
Source: Milken Institute "A Matter of Degrees: The Effect of Educational Attainment on Regional Economic Prosperity" (2013)

The Way Forward: Career Technical Education and Training

These findings suggest that important, cost-effective opportunities in reducing income inequality and promoting economic growth in California can be developed by working with the California Community Colleges system and other postsecondary institutions in boosting postsecondary career technical education through associate degree and certification programs. The state's community colleges play a vital role in providing workplace skills. There are 113 community colleges serving more than 2.1 million students by delivering the basic skills, transfer preparation, and workforce training. Students can enroll in certification and degree programs in 350 fields of study.[9] Additionally, the community colleges offer short-term training synchronized to third-party credentials, apprenticeship programs, and incumbent worker training to update skill sets in a variety of industrial sectors.

While the state should support attendance and graduation from both the University of California and California State University systems, increased funding for postsecondary career technical education and (CTE) training will have a more immediate impact on reducing wage inequality. California employers have difficulty recruiting workers with the technical needed skills to fill job vacancies. The need for workers with such training will grow. If current trends prevail, 1.9 million jobs, or 30 percent of all job openings in California by 2030, will require postsecondary education below the level of a four-year degree. (See Figure 4). California's middle-skills education channel is falling behind relative to the skills and education demanded by employers now and for the future. California must significantly increase the number of workers with industry-relevant, middle-skill degrees, credentials, and certificates.

FIGURE 4 Job openings by education level (2015-2025)



Source: Georgetown University Center on Education and the Workforce, "Recover: Job Growth and Education Requirements Through 2020," State Report, June 2013. Analysis: Collaborative Economics

9. Task Force on Workforce, Job Creation, and a Strong Economy: *Report and Recommendations*, California Community Colleges Board of Governors, 2015, p.7. This document was a key source of information background on Career Technical Education. http://doingwhatmatters.cccco.edu/Home.aspx

Employers in critical industries from aerospace to precision machine tools report that it is increasingly difficult to find qualified candidates to fill vacancies because the workers with the skills and aptitudes necessary are in short supply. Many firms expand outside of California in order to attract the talent necessary for their growth or to maintain current production levels as skilled employees retire. It is of paramount importance that California begin to even this mismatch, which threatens the state's long-term economic prosperity and the income-earning ability of thousands of Californians.

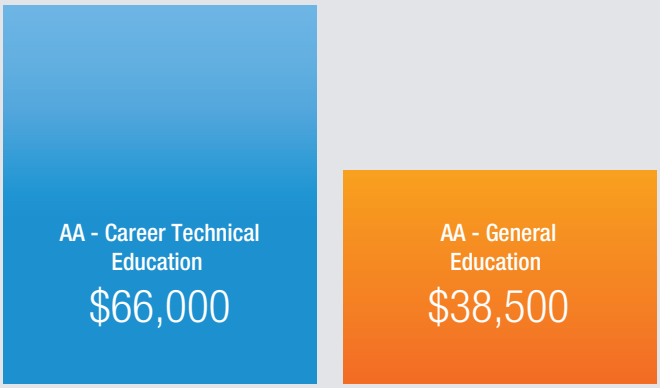
Career Pathways

Career pathways provide an effective framework for increasing enrollment in, and more important, completion of postsecondary education. Based on a report from the California Community Colleges' Student Success Task Force (2012),[10] only about half of degree-seeking students achieve their education objective. The graduation rate for students from minority populations such as Latinos and African-Americans is lower than the average.

Career pathways were developed to improve the rate of completion. Community college students typically require more support services than students entering a four-year degree program because many are the first members of their family to attend a postsecondary institution. The pathways approach is valuable to these students because they haven't been exposed to the career opportunities that are available. Career pathways provide a fluid, sequential progression of education, technical training, and career advancement by introducing students to careers beginning in middle school and advancing to high school programs that eventually lead to degree, certificate, or other credential attainment in community college. This process also can progress into a four-year degree program.

Pathways are effective for a variety of populations but are most applicable to adult learners, especially those from marginalized populations who have low education and skill levels. Well-designed pathways provide opportunities for multiple entry and exit ramps as students advance to successively higher education attainment and training, work experience, and support services such as professional career counseling.

FIGURE 5 Annual earnings 5 years later



Source: Salary Surfer, 112 California Community Colleges

10 http://californiacommunitycolleges.cccco.edu/Portals/0/Executive/StudentSuccessTaskForce/SSTF_Final_Report_1-17-12_Print.pdf

The role that well-aligned CTE programs, which provide industry-needed skills, can play in reducing wage inequality is illustrated by a comparison of wages earned by workers with CTE degrees vs. those with more general associate degrees.[11] As Figure 5 shows, based on information from the California Community Colleges' Student Success Scorecard, a CTE associate degree (AA) on average results in annual wages of $66,000 five years later, while a general AA yields just $38,500, a premium of 71.4 percent. For example, two years prior to enrolling in an AA degree program in wastewater technology, students earned $50,956 on average, but five years after completing the course, they earned $86,391. Table 1 has more examples.

TABLE 1 Median annual salary by instructional program

Curriculum	Award Type	Median Annual Salary		
		2 Years Before	2 Years After	5 Years After
Aeronautical and Aviation Technology	Degree	$36,712	$66,741	$76,187
Aviation Airframe Mechanics	Certificate	$26,841	$39,754	$49,997
Diesel Technology	Certificate	$34,630	$48,427	$53,253
Industrial Systems Technology and Maintenance	Certificate	$37,787	$74,950	$72,248
Water and Wastewater Technology	Degree	$50,956	$77,973	$86,391

Source: Salary Surfer, 112 California Community Colleges.

In order to enhance students' future earning potential, it is important to guide them on the various options in selecting a study program. Hands-on career guidance on labor market demand can be critical in making an informed choice. The core components of career pathway programs must include navigation structures and routines that engage students. Career navigation structures should provide current information, identify high-demand occupations and necessary job skills, provide information on the cost and quality of education and training programs, and delineate the most efficient routes to credentials that lead to good jobs. It is crucial that this advice include the perspectives of incumbent employers in the region, as they will have the latest information on the skills needed to obtain the most immediate employment and highest compensation.

Employer engagement and curriculum: Frequent interaction between colleges and industry is essential in order to integrate certifications and skills that are in alignment with employer requirements. Educators do not always communicate in the same terminology as industry, making it challenging to engage in a productive manner. Furthermore, heavy instructional assignments can make it challenging for instructors to remain current with changes transforming industries and technological applications. Consequently, postsecondary institutions can have insufficient industry-specific knowledge of the latest technical courses and other various work-based-learning curriculum courses.

Employers become engaged most effectively when they are given numerous opportunities to interact in pathways development. This should include curricula input, serving on advisory boards, providing apprenticeship opportunities for both traditional students and adult incumbent workers, and regional partnerships.[12] It is essential that career pathways meet the needs of displaced workers and veterans. Their inability to find jobs that provide a living wage are a major source of rising wage inequality.

11. Sandy Baum, Jennifer Ma and Kathleen Payea, "Education Pays 2013: The Benefits of Higher Education for Individuals and Society," *Trends in Higher Education Series*, The College Board, 2013, p.10.
12. Debra Bragg, Russell Hamm, and Kay Trinkle, "Work-Based Learning in Two-year Colleges in the United States," Berkeley, CA: National Center for Research in Vocational Education, 1995. http://www.nrccte.org/resources/publications/work-based-learning-two-year-colleges-united-states

Recent trends reveal an increased demand from employers for near-term training in alignment with a third-party credential, either an industry-based certification or a state license. These processes meet companies' need to validate an applicant's level of skill. Adult students may enroll in just one or two community college skill certification courses to cement or acquire skills necessary for ongoing employment or career advancement with no intention of completing a degree. Studies demonstrate that many of these certifications boost earnings and future promotion opportunities.

Career pathways offer a clear model for deeper relationships and increased goal alignment between colleges and industry. This requires collaboration with Workforce Investment Boards (WIBs) to maximize apprenticeship engagement programs. Faculty must be incentivized to develop value-based interactions with industry partners to initiate a seamless, cross-institutional infrastructure to solidify an ongoing relationship.

Apprenticeships and other work-based learning, such as internships, provide an opportunity for students to apply their knowledge, gain valuable hands-on experience, and develop the day-one readiness and foundational skills necessary to succeed in the labor market. Paid apprenticeships permit students to develop industry-ready skills while earning money to assist with living expenses. Without these opportunities, many students will seek paid employment unrelated to their pathways, and adult learners in particular may not complete their coursework because of financial strain.[13]

CTE curriculum must be updated on a regular basis with structured review processes. A major obstacle to achieving this objective is the lengthy state and local approval processes, which slow curriculum development and revision. The California Education Code and Title 5 regulations provide the framework for community college curriculum development and approval. Many CTE experts believe this process needs to be streamlined/clarified to obtain greater efficiencies.

There are several other threads to aligning industry skill demands in the regional labor market with CTE curriculum development. In order to provide the best opportunity for students who complete programs to find a job in their field of study, it is essential that CTE faculty closely develop program material based on sufficient input from industry representatives and community leaders. Another requirement of the program drafts is that they must be reviewed by the regional consortia for validation before submission to the Campaign for College Opportunity (CCO). This process can eliminate duplication of programs, which could lead to oversupply of students in regional labor markets.

Regional alignment: Given the vast differences in the composition of industry clusters around the state, it is essential to base CTE programs on regional needs. For example, information and communications technology sectors of the San Francisco Bay Area demand CTE programs aligned with their needs, while the entertainment cluster in Los Angeles requires programs in such areas as graphic design and special-effects production. This ensures that CTE graduates have skills aligned with the major employers where they are receiving instruction. Furthermore, federal, state, and non-government foundation-based initiatives can have overlapping goals that can frustrate objectives. This can lead to duplication, fragmentation, and improper alignment, confounding efforts to place students with employers. This regional approach attempts to avoid any misalignment.

Fortunately, California has taken steps in this direction. Community colleges and their workforce partners have formed an integrated regional system to better align regional labor requirements to address the middle-skills gap. This reflects a growing consensus among national and state efforts to organize workforce skill delivery around regional needs. The recently enacted federal Workforce Innovation and Opportunity Act (WIOA) addresses the necessity to coordinate regional efforts to better align education providers and industry.

13. See Walter Wisely, "Effectiveness of Contextual Approaches to Developmental Math in California Community Colleges (Doctoral Dissertation, University of the Pacific, 2009; Davis Jenkins, Matthew Zeidenberg, and Gregory Kienzl, "Educational Outcomes of I-BEST Washington State Community and Technical College System's Integrated Basic Education and Skills Training Program: Findings From a Multivariate Analysis (Community College Research Center," May 2009. http://ccrc.tc.columbia.edu/publications/i-best-multivariate-analysis.html

California has taken some action to enhance regional CTE program coordination. California's 2015-2016 Budget Act contains language requiring common performance metrics and employer involvement in regional workforce development programs. Further, community colleges have focused efforts on better identifying and aligning activities to address regional industry needs.

A framework by the California Community Colleges chancellor's office called Doing What Matters (DWM) interweaves various resources and incentivizes CTE program support in incumbent and emerging industry sectors. DWM works with regional consortia, technical assistance providers, and sector/deputy sector navigators to identify and coordinate programs that are more efficiently delivered regionally.

Funding and Implementation of CTE

The California Community Colleges system was given an important assignment under the California Master Plan: preparing students for transfer to a four-year university. However, this legacy has left the system struggling to gain traction in garnering a similar level of support for its CTE and workforce mission.[14] For example, at a time of rising demand for CTE graduates, CTE's proportion of total California community college enrollment fell from 31.3 percent in the 2000-2001 academic year to 28.2 percent in 2014-2015.[15]

Although lawmakers and other senior policy officials claim to be aware of the critical need for CTE offerings, efforts to increase funding to expand CTE programs have been insufficient. Funding mechanisms for CTE programs are important because they express institutional priorities. In many respects, CTE courses are discouraged because they usually are more expensive due to equipment requirements such as machine tools, medical equipment, digital editing bays, etc.). Table 2 displays the wide cost variation in a few instructional programs that are common programs at most community colleges. Humanities courses typically can be offered for around $52 per student credit hour based on information from the 2011-2012 school year. However, courses in design engineering technologies and respiratory care therapy cost $163 and $265, respectively.

TABLE 2 Instructional cost per student credit hour, national averages (2011-12)

Humanities Humanistic Studies	$52
Biology, General	$64
Engineering-Related Technologies	$73
Allied Health and Medical Assisting Services	$131
Drafting/Design Engineering Technologies/Technicians	$163
Respiratory Care Therapy/Therapist	$265

Source: National Community Colleges Cost and Productivity Project, National Higher Education Benchmarking Institute

The funding formula for California community colleges is based on a constant rate per full-time-equivalent student and includes required annual enrollment targets. The result: A financing disincentive is institutionalized for CTE programs because a similar dollar allocation is extended across more non-CTE courses. CTE programs are not always the highest cost of instruction, but due to the special laboratory equipment needs and small class-size requirements of many courses, they typically are higher than liberal arts/four-year university transfer-related courses.

14. Nancy Shulock, Jodi Lewis, and Connie Tan, "Workforce Investments: State Strategies to Preserve Higher-Cost Education Programs in Community and Technical Colleges, Institute for Higher Education and Leadership Policy, California State University Sacramento, August 2013, p. 2-11.
15. Task Force on Workforce, Job Creation, and a Strong Economy: *Report and Recommendations*, California Community Colleges Board of Governors, 2015, p. 29

This funding imbalance has clearly played a role in restriction of CTE course offerings.

It is necessary to institute a funding mechanism that sustains community colleges' capacity to create, adjust, and maintain CTE courses and programs that are responsive to regional industry market requirements. This should include developing a formula in which regional industry businesses match any increase in CTE funding above the average of non-CTE programs. Additional financial incentives may need to be provided to institutions based on the percentage of graduates hired by regional firms. Adequate funding of equipment and facilities must be provided through a new, sustainable funding stream by partnering with industry cluster representatives.

Finally, data collection to report employment, wage, and other program metrics on outcomes for accountability purposes is essential. A vast array of best practices from other states can be drawn upon that honor California community colleges' dual mandate to prepare students for transfer to four-year colleges and to expand high-cost CTE programs that maximize the future earning potential of graduates. More effort is needed to communicate the importance of CTE/middle-skills workforce education. Along with efforts to improve California community college transfer success, we must adjust how the state communicates with nontraditional students, adult learners, and their families on the value of CTE/workforce programs to their short- and long-term career objectives.

Conclusions

California's community colleges have a strong career technical education mission and, with added emphasis, priorities, and sustained funding support, are well positioned to close the existing and impending wage and skills gaps. Here are a few additional specific ideas to promote CTE expansion:

- California should consider other personal education funding options, such as personal income tax credits, to encourage individuals to pursue and complete CTE related programs.
- The state should publicize the philanthropic opportunities that are available to fund physical facilities and laboratory equipment required for CTE courses.
- Businesses should consider funding CTE programs by providing tuition assistance and/or capital investments.
- State government must remove barriers to student choice by encouraging expansion of technical and professional certification programs.
- Community colleges need to expand their use of flexible CTE program options and technology-enriched platforms that encourage learning anytime, anywhere, especially for part-time students and working adults.
- State government should recognize and reward institutions that partner with business to increase educational and job opportunities.
- Report cards on CTE enrollment and program completion should be enhanced and more widely available. These metrics should be shared with students prior to enrollment.

Career technology education in the fields of science, technology, engineering, and math (STEM) will have important spillovers in the technology sector. In the innovation-based economy, it is not just Ph.D.s and other advanced degrees in STEM areas that determine whether California has sufficient depth of human capital. There is an unmet, growing need to fill these middle-tier technology industry jobs.

California ranked 17th in the Human Capital composite in the Milken Institute's 2014 State Technology and Science Index, a decline from fourth in the inaugural reading in 2002—the largest drop in the nation.[16] This indicator attempts to measure stocks and flows of various science, engineering, and other fields. California ranked 41st in recent degrees in the Science and Engineering per 1,000 Civilian Workers category in the 2014 index, a fall from 15th in the 2002 index. More STEM talent must be produced in California, not imported from other states and countries.[17] This requires bringing more Latinos into the STEM fields because they will represent the bulk of California's working-age population. This will be most critical in the Central Valley.[18]

CTE programs are in need of a senior policy official who can champion their cause and lead legislators, educators, and industry to greater collaboration in achieving these objectives. This could be driven by the governor's office, but any state constitutional officer or legislative leader could be effective in this role. The state's workforce, economy, and future tax revenues would be the biggest beneficiaries.

16. Kevin Klowden, Kristen Keough, and Jason Barrett, "2014 State Technology and Science Index: Enduring Lessons for the Intangible economy," Milken Institute, December 2014
17. Ross DeVol, Kristen Harris, and Minoli Ratnatunga, "California's Innovation-Based Economy: Policies to Maintain and Enhance It," Milken Institute, December 2016, pp. 28-30
18. Geoffrey Mohan, "Salinas Hopes to Turn Farm workers' Children into Computer Scientists," Los Angeles Times, February 5, 2016. http://www.latimes.com/business/la-fi-salinas-ag-tech-20160207-story.html

About the Author

Ross DeVol is the chief research officer at the Milken Institute. He oversees research on international, national and subnational growth performance; access to capital and its role in economic growth and job creation; and health-related topics. Since joining the Institute, DeVol has put his group in the national limelight with groundbreaking research on technology and its impact on regional and national economies, and on the economic and human consequences of chronic disease. DeVol has authored numerous reports in the Institute's primary research areas. He specializes in the effects of research and development activities, international trade, human capital and labor-force skills training, entrepreneurship, early-stage financing, and quality-of-place issues on the geographic distribution of economic activity. His "Best-Performing Cities: Where America's Jobs Are Created," was first published in 2004 and regularly updated since. It reveals which cities are creating jobs and economic opportunity and describes the factors determining long-term success. In "A Matter of Degrees: The Effect of Educational Attainment on Regional Economic Prosperity," he and colleagues demonstrated the high returns to investment in higher education and the research spillovers that universities facilitate. His recent work involves global economic and financial market conditions. DeVol is ranked among the "Super Stars" of Think Tank Scholars by International Economy magazine and regularly appears on national television and radio programs, including CNN's "Moneyline," "Wall Street Journal Report with Maria Bartiromo," "Bloomberg West," "Fox Business News" and CNBC. He is frequently quoted in print media, such as the Wall Street Journal, the Financial Times, Investor's Business Daily, the Los Angeles Times, Forbes, the Economist, Time and others.

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