

MILKEN
INSTITUTE

Preparing California for the Future of Work

Creating Equity by Addressing the
Access Gap

MATT HORTON, MICHAEL BERNICK, JENNIFER
LOVETT, AND MISAEL GALDAMEZ



ABOUT THE MILKEN INSTITUTE

The Milken Institute is a nonprofit, nonpartisan think tank. We catalyze practical, scalable solutions to global challenges by connecting human, financial, and educational resources to those who need them.

We leverage the expertise and insight gained through research and the convening of top experts, innovators, and influencers from different backgrounds and competing viewpoints to construct programs and policy initiatives. Our goal is to help people build meaningful lives, in which they can experience health and well-being, pursue effective education and gainful employment, and access the resources required to create ever-expanding opportunities for themselves and their broader communities.

ABOUT THE CENTER FOR REGIONAL ECONOMICS

The Milken Institute Center for Regional Economics produces research, programs, and events designed to inform and activate innovative economic and policy solutions to drive job creation and industry expansion.

©2020 Milken Institute

This work is made available under the terms of the Creative Commons AttributionNonCommercialNoDerivs 3.0 Unported License, available at creativecommons.org/licenses/by-nc-nd/3.0/.



CONTENTS

2	Introduction
9	Part I. Workforce Adaptation and State Action: 1963–2000s
14	Part II. Workforce Adaptation: Training and Upskilling Case Studies
22	Part III. Developing the Roadmap and Preparing the State for the Future of Work
29	Conclusion
30	Appendix: A Snapshot of 21st Century Workforce Education and Training Programs
35	Acknowledgments
35	About the Authors



PREPARING CALIFORNIA FOR THE FUTURE OF WORK

Creating Equity by
Addressing the Access Gap

Matt Horton, Michael Bernick,
Jennifer Lovett, and Misael Galdamez

INTRODUCTION

According to the headlines, California appears to enjoy a vibrant economic landscape. In 2016, the US Bureau of Labor Statistics reported that California's gross domestic product (GDP) exceeded \$2.5 trillion, making it the fifth-largest economy in the world—larger even than the United Kingdom or France. According to the Bureau of Labor Statistics, between 2007 and 2017, California contributed more than any other state to America's productivity growth.¹ And, as of 2019, unemployment in California is at record lows.²

1 Bureau of Labor Statistics, "BLS Publishes Experimental State-level Labor Productivity Measures," *Monthly Labor Review*, June 2019, <https://www.bls.gov/opub/mlr/2019/article/bls-publishes-experimental-state-level-labor-productivity-measures.htm>.

2 Employment Development Department, "California Unemployment Rate Falls to 3.9 Percent in October, Setting New Record Low," November 15, 2019, <https://www.edd.ca.gov/newsroom/unemployment-november-2019.htm>.



Yet, shrinking opportunities for prosperity hide behind the state's strong economic output. Although places like Los Angeles and the Bay Area have seen growth in high-wage, high-skill jobs, low-wage and low-skill jobs still make up significant proportions of both regions' labor forces. When factoring in housing and living costs, California has the highest poverty rate in the nation—perhaps a more accurate indicator for assessing the state's economic standing.

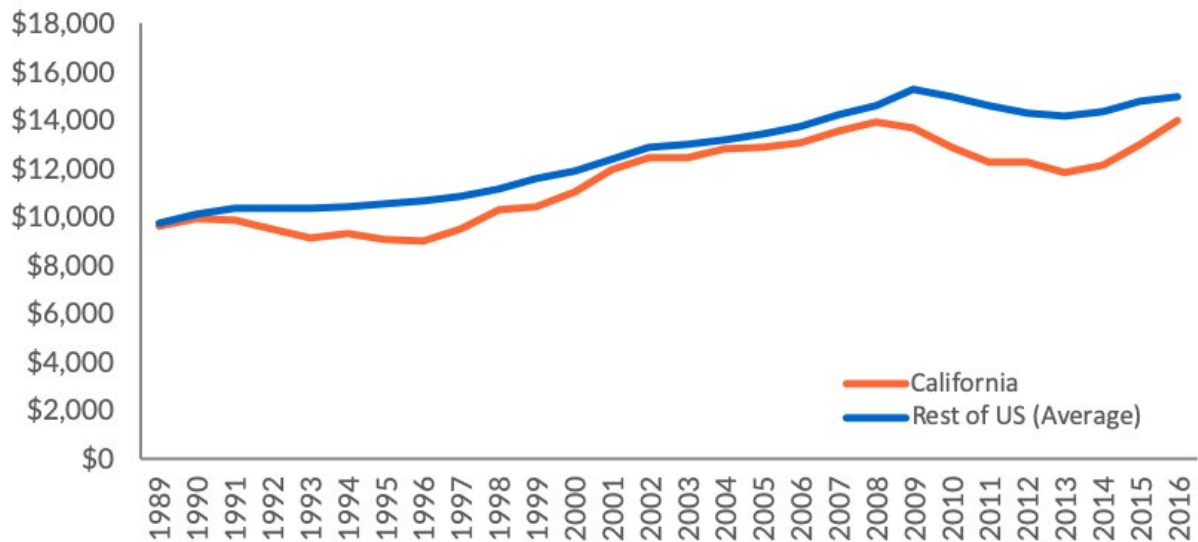
In sharp contrast to the promise of the post-WWII California dream, many middle and working-class residents throughout the state are forced into bleak economic trade-offs. Families must choose between paying high rents and long commutes, or between paying for child care or health care. These choices leave many without the financial stability or ability to stay in their communities and with some facing the reality of leaving the state altogether.

How did we get here? A number of workforce indicators paints a picture of a struggling and underequipped workforce:

- Despite recent gains, California's per-pupil public education spending levels are historically low compared to other states, while adult education spending continues to languish.³

Figure 1: California's Education Expenditure Continues to Lag

Total per Pupil Expenditure, 2019 Dollars



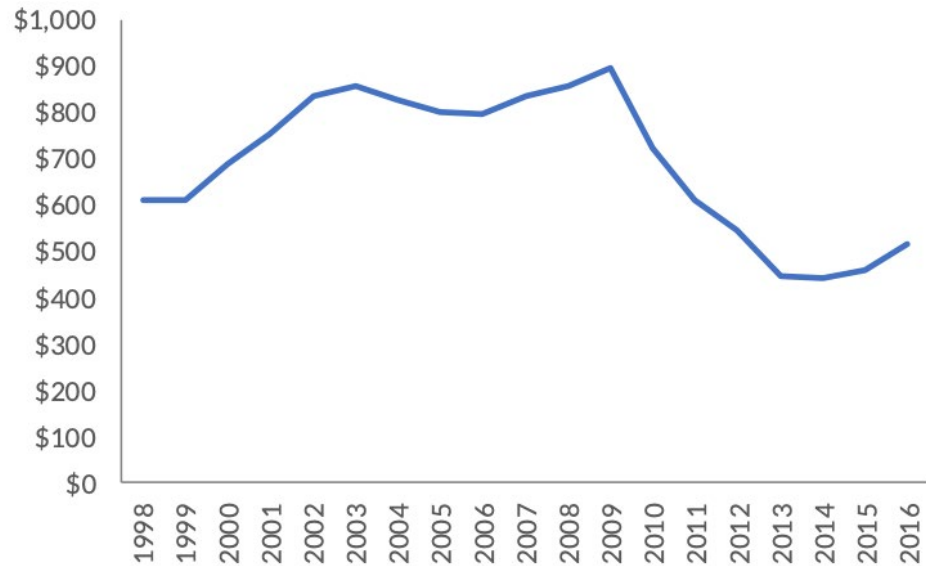
Source: National Center for Education Statistics, 2019.

Note: Total per pupil expenditure includes spending for public elementary and secondary education and excludes debt financing, community services, equipment, and school construction spending.

3 Patrick Murphy and Jennifer Paluch, "Just the Facts: Financing California's Public Schools," Public Policy Institute of California, November 2018, <https://www.ppic.org/publication/financing-californias-public-schools/>.



Figure 2: Adult Education Spending in California Remains Historically Low
Total Adult Education Expenditure, Millions (2019 Dollars)



Source: National Center for Education Statistics (NCES), 2019.

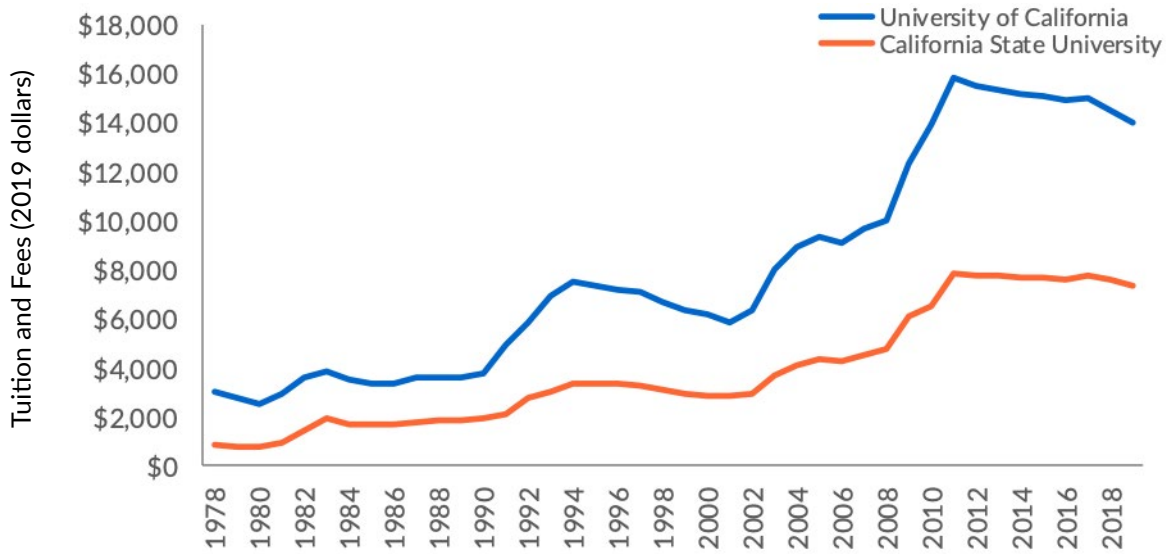
Note: Adult education spending includes expenditure for adult education programs that are not a part of public elementary and secondary education.

- A decline in public education spending was matched by an overwhelming rise in the costs of higher education; University of California (UC) tuition rates have increased by 800 percent since 1990, well outpacing the rate of inflation and income growth. Over the past decade, tuition at the California State University (CSU) system has increased by more than 280 percent.



Figure 3: College Costs Have Grown with Tuition Increases

Systemwide Tuition and Fees for California Resident Undergraduates, 2019 Dollars

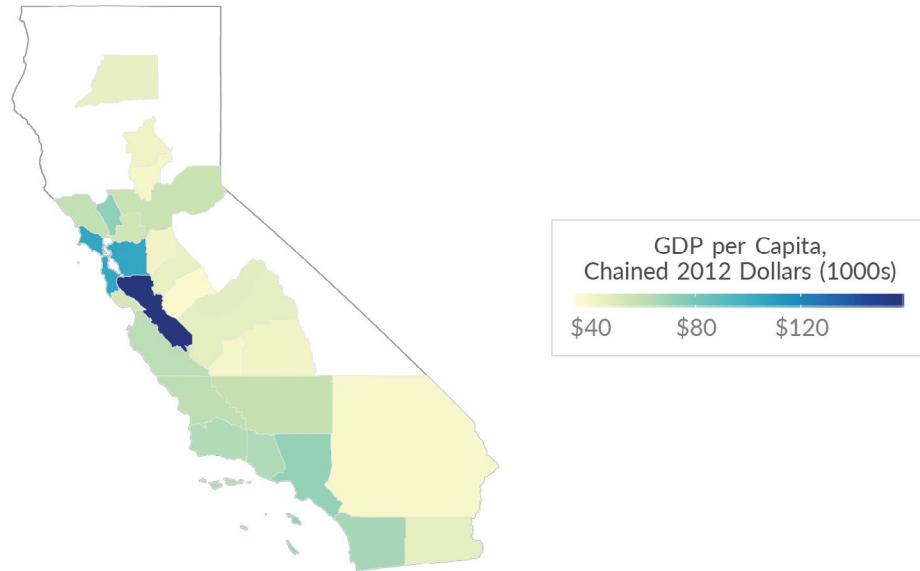


Source: University of California and California State University, 2019.

- Geographic disparities in income and productivity are exacerbated by similar disparities in research and development spending. Innovation and knowledge-based economic development have largely concentrated on the coasts. As a result, economic mobility is limited.

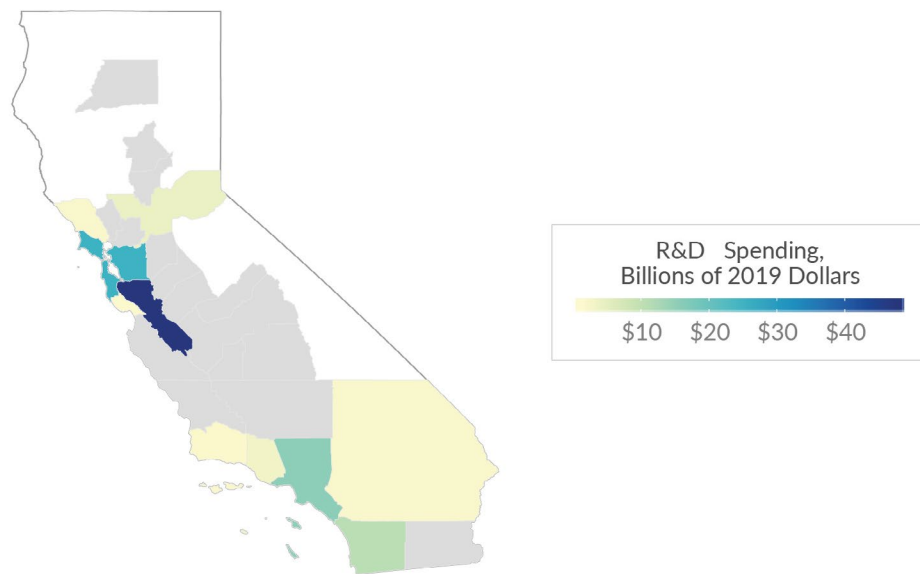


Figure 4: Coastal Metros Are the Most Productive
Metro-Level Gross Domestic Product per Capita, 2018



Source: Bureau of Economic Analysis, 2019.

Figure 5: R&D Spending Is Concentrated in a Few Coastal Metros
US Research and Development Performed by Companies, 2015



Source: Business R&D and Innovation Survey, 2015.

Note: Gray indicates a lack of data available on R&D spending.



- While productivity in the state has grown tremendously, worker compensation has stagnated. The Labor Center at UC Berkeley estimates that productivity grew 89 percent between 1979 and 2013 in California, while median hourly compensation grew by only 3 percent in the same time period.⁴

Based on these indicators, there is little doubt that part of the state's unfolding economic narrative is tied to underinvestment in education and workforce needs at a time when the nature of work itself is changing. Automation has enhanced productivity but also eliminated jobs and reshaped the skills needed for others; higher levels of education and training are increasingly required to obtain well-paying jobs. The speed and scale at which advancement in technology is influencing jobs also require a continuous process of adaptation and learning from workers and education systems.

As the need for more highly educated workers grows, there is evidence that California's workforce and education systems are not prepared to meet this demand. By 2030, the state is expected to have a shortage of 1.1 million workers holding a bachelor's degree.⁵ Key segments of the population also face barriers to obtaining the education and training necessary to access higher-paying jobs.

Across all postsecondary institutions, women are more likely to graduate than men, and students from wealthier families are more likely to graduate compared to students from low-income families, as are White and Asian American compared to African American and Latino students.⁶ While graduation rates of demographic groups traditionally underrepresented in higher education are improving, the barriers—including cost and a lack of adequate college preparatory resources—are formidable.

And without adequate training, a full-time job is often insufficient to guarantee economic stability. Statewide, it is estimated that 12.7 percent of working adults are in poverty, and, of those, only 18 percent have a bachelor's degree or higher.⁷ California's continued economic success thus depends on cultivating a 21st-century workforce, one built on robust, broad-based access to education and employment opportunities around the state. This includes establishing and consolidating partnerships across sectors and industries to facilitate access to education and training, as well as providing access to the education and training required for employment in tomorrow's job market.

4 Annette Bernhardt, Ian Eve Perry, and Lindsay Cattell, "Low-Wage Work in California: 2014 Chartbook," UC Berkeley Labor, April 30, 2015, <http://laborcenter.berkeley.edu/lowwageca/>.

5 Hans Johnson, Marisol Cuellar Mejia, and Sarah Bohn, "Will California Run Out of College Graduates?" Public Policy Institute of California, October 2015, <https://www.ppic.org/publication/will-california-run-out-of-college-graduates/#fn-1>.

6 PPIC Higher Education Center, "Improving College Completion," Public Policy Institute of California, October 2019, <https://www.ppic.org/wp-content/uploads/higher-education-in-california-improving-college-completion-october-2019.pdf>.

7 Sarah Bohn, Caroline Danielson, and Tess Thorman, "Just the Facts: The Working Poor in California," Public Policy Institute of California, July 2019, <https://www.ppic.org/publication/the-working-poor-in-california/>.



This report focuses on how the public and private sector workforce systems in California have adapted to technological change in the past and how current innovative projects are supporting adaptation, especially in the private sector. It draws on research and a series of sessions the Milken Institute has hosted in the past year throughout the state, as well as structured interviews with workforce entrepreneurs in the private sector. Particular attention is given to addressing the access gap and fostering equity in training and job access.



PART I. WORKFORCE ADAPTATION AND STATE ACTION: 1963–2000S

Current discussions in California regarding technology's impacts on employment are often ahistorical, not recognizing how often this issue has come up in state government over the past five decades. Furthermore, these discussions often fail to recognize how the workforce system in California adapted to automation and technology in the past.

Throughout the post-World War II period, California officials have been consistently concerned about technologically related job losses. But, in certain periods, fears of automation and technology were particularly heightened and resulted in government task forces, similar to the California Future of Work Commission established by Governor Gavin Newsom in the first few months of his administration.

Early “Future of Work” Commissions in California

In June 1963, fearing the worst of automation and technological adaptation in California, the state legislature created the Commission on Manpower, Automation, and Technology.⁸ The commission traveled throughout the state in 1964, gathering testimony from labor researchers, employers, and worker representatives. Much of this testimony came from union officials, who described how automation was putting their members out of jobs.

Officials with the Cannery and Food Processing Workers, for example, detailed the rapid movement in processing from the mechanization that started in World War II to the advanced automation the industry was currently undergoing. Food processing output was increasing, even as the number of workers declined. Similarly, the State Council of Carpenters detailed how the new capital processes and newly established computer scheduling cut the need for construction workers on major infrastructure projects. Even the Milk Wagon Drivers, Local 302, whose membership had dwindled to 1,400 by 1964, testified to job losses due to the technological advances in maintaining perishable products.⁹

On the other hand, a few employers spoke of the benefits of automation. A human resources manager with the Fireman's Fund marveled at the company's new data processing unit, which enabled the company to process claims more accurately while eliminating routine administrative jobs.¹⁰ But it was automation-driven job losses,

8 State of California Commission on Manpower, Automation and Technology, “Report to the Governor and the Legislature,” December 31, 1964.

9 Ibid, 12-15.

10 Ibid, 16. Jack McGowan, vice president for personnel at Fireman's Fund Insurance, noted that “when we started on the data processing our accounts receivable bookkeeping operation consisted of about 60 people. Today, with data processing, we have about 40...but we are doing two-and-one half times more volume.”



The commission made note of several actions that could be undertaken by employers to reduce the dislocations brought by automation: more vigorous layoff aversion, advance notice of plant shutdowns, easing the burden of unemployment through severance payments, and supplemental unemployment benefits. The commission also suggested an expansion of the state-funded employment system to retrain workers. Over the next several years, most of these approaches found their way into wider practice.

The commission also considered ideas on job creation. An official with the United Electrical, Radio, and Machine Workers called for a 35-hour workweek (with no pay reductions). Don Vial, then-head of the UC Berkeley Labor Center, urged greater government investment away from defense and space goods towards more “peaceful pursuits” such as parks, urban renewal, and health care to create jobs for a wider range of Californians. William McGuigan of the Stanford Research Institute suggested targeted government investment in industries the institute expected to grow, including personal aircraft and desalinization, neither of which ever got off the ground.¹¹

These government job creation ideas did not move forward. Rather than lose jobs, the California economy saw unprecedented job growth in the last half of the 1960s. Automation eliminated jobs as predicted, but the economy’s evolution created more than enough replacement jobs. Non-farm payroll jobs totaled 5.6 million statewide in December 1964 and had jumped to over 7 million by December 1969. Over the next five decades, the state economy continued its job expansion, reaching its current level of more than 17 million payroll jobs in spring 2019.¹²

The concerns about automation did not end in the 1960s. The 1970s and early 1980s brought a new wave of concerns about global competition and de-industrialization. In the period between 1980 and 1983, more than 900 industrial facilities closed in California, including in the automobile manufacturing, lumber and paper mill, food processing, and steel industries. The Kaiser steel plant in Fontana, California—modernized just years earlier at a cost of \$250 million—closed in 1982–83, laying off 4,500 workers. The International Paper Plant in Siskiyou County (600 workers) and the General Motors auto plant in Fremont (6,500 workers) also shut their doors.

11 Ibid, 26. The Stanford Research Institute’s identification of promising industries in California for job growth, which also included laundry and dry cleaning and ocean mining, does not hold up well over time.

12 California Employment Development Department, “History of California Unemployment and Total Nonfarm Employment: 1940-2009,” September 2009.



Fearing that manufacturing was losing its viability, the state government responded with several committees on automation/technology and job loss. Then-Governor Jerry Brown's administration quickly established a "Reindustrialization" task force as well as a "Reinvestment" task force. In the legislature, more than a dozen different bills were introduced to combat de-industrialization, including bills on employee stock ownership plans, new government-backed funding for ailing businesses, and even a "Displaced Worker and Ridesharing" program—a van service to connect laid-off workers to jobs.

The next two decades saw the dot.com boom and bust and brought a third wave of state government blue-ribbon committees on technology and jobs. In the late 1990s and early 2000s, the Davis Administration and state legislature worried that emerging technology firms like Webvan, Pets.com, and eToys would soon eliminate most retail jobs in California and directed the state employment department to look into this dynamic. After the dot.com bust, the Davis Administration, followed by the Schwarzenegger Administration, were concerned technology consolidation was eliminating jobs within the Information Technology sector.

Adaptations of California's Workforce System

This quick review of state government task forces shows how today's automation and technology concerns echo concerns of the past. At the same time, a look at past decades shows how the public and private workforce entities in the state adapted to job losses and changes. Training curriculum adjusted to meet changing skill needs, and both the private and public sectors targeted new occupations for training in line with their relative growth and decline.

At the time of the state's Commission on Manpower, Automation and Technology in the 1960s, the first major post-World War II federal job training funds became available under the Manpower Development Training Act (MDTA).¹³ MDTA funded public and private entities in California to train for jobs in demand, which, in the mid-1960s, translated into training for bank tellers, secretaries, auto mechanics, television repair, and upholstery.

Over the next few decades, as automation led to the disappearance or restructuring of these jobs, training entities also shifted course. These entities, first funded by MDTA and in the 1970s by the Comprehensive Employment and Training Act, were primarily community colleges, community-based organizations, and private proprietary schools. They generally had sector-based employer advisory groups and kept in close touch with local employers.¹⁴

Today's concerns about automation and technology eliminating jobs echo concerns of the past.

¹³ Michael Bernick, *The Dreams of Jobs*, Olympus Publishers, 1964, pg 40-41.

¹⁴ Ibid, 43-44.



As late as 1979, the San Francisco Renaissance Center, a nonprofit training agency, was training in business machine repair (e.g., typewriters, adding machines, and copiers). At the time, the South of Market area was dotted with small business machine repair shops, whose owners formed the Business Machine Repair Industry Advisory Committee—a committee established by Renaissance. Within a few years, these repair jobs were gone, as were the small business machine repair shops and typewriters, all replaced by newer technology. At this point, Renaissance halted the business machine repair training and pivoted to training for emerging roles as personal computer technicians and telecommunications technicians. Similarly, other groups training bank tellers and secretaries adjusted to the technological changes, following not government direction but market forces.¹⁵

Indeed, the training system—community groups, community colleges, workforce intermediaries, and private training institutions—continues to evolve today in line with technology and market signals. When the internet expansion began in the 1990s, the system shifted on its own to train for emerging jobs in customer service/help desks, software development, and related occupations. In recent years, the system has added training for technicians in fast-growing fields like cybersecurity (e.g., cybersecurity technician) and data science (e.g., data analytics technician). Training agencies closely follow the demand for workers in different regions and adjust training accordingly.

¹⁵ Michael Bernick, “After Robots Take Our Jobs, Then What,” *Forbes*, April 11, 2017.



The Role of the Higher Education Master Plan?

While automation created cause for worker concern in the 1960s, California's higher education system faced different pressures: impending enrollment growth as a result of the "baby boom." The best projections expected enrollment to triple between the 1960s and 1970s. In reality, it quadrupled.¹⁶ Moreover, these institutions lacked a governance structure to guide growth, while state colleges and the Universities of California competed over the domains of research and graduate training.¹⁷

The Higher Education Master Plan, adopted into law in 1960, created a cohesive governing body and system for the state's colleges and universities. It established eligibility pools, cost and funding expectations, financial aid expectations, and a governance structure for each of the three governing boards.¹⁸ While this planning effort set the groundwork for an unprecedented investment and expansion of enrollment, as well as research and development, workforce concerns were absent from the master plan. The plan enshrined "public commitment to develop human resources as the state's greatest asset," but its emphasis landed squarely on developing a "well-educated citizenry...for a free and healthy society."¹⁹

In the 1960s, a college education was not necessarily designed to facilitate a middle-class life. Employment in manufacturing and professional services composed roughly equal shares of the economy—about 20 percent. The Master Plan succeeded in preparing California's higher education institutions for massive enrollment growth in an economy in which college was not a necessity. In contrast to the 1960s, as automation and technology disrupt today's labor market, higher education grows in importance. Roughly 42 percent of today's jobs are in the professional services industry.²⁰ In 2030, roughly 38 percent of all jobs will depend on workers with a bachelor's degree, while only 33 percent of workers will have one—a gap of 1.5 million workers.²¹

16 Governor's Office of Planning and Research, "The Master Plan for Higher Education in California and State Workforce Needs," December 26, 2018, pg 1.

17 The Select Committee on the Master Plan for Higher Education, "The California Master Plan for Higher Education in the Seventies and Beyond," Council Report 72-6, November 1972, pg i.

18 Legislative Analyst's Office, "Overview of Higher Education in California," Sacramento, California, August 31, 2017.

19 The Select Committee on the Master Plan for Higher Education, pg x.

20 Governor's Office of Planning and Research, pg 3.

21 Johnson et al., "Will California Run Out of College Graduates?" footnote 1.



While California's public colleges and universities have demonstrated an ability to serve as engines of opportunity—CSU and UC are consistently ranked among the best for economic mobility in the US²²—preparing for coming changes in technology and labor market disruptions will require fundamental changes to the higher education pipeline. In particular, access to skills and industry-oriented curriculum for a prospective, incumbent, or disconnected worker must be a primary focus. This adaptation would further support the fulfillment of the Higher Education Master Plan's promise that "public higher education [should] be responsive and responsible to the people of the State in providing...fields of study by which educational foundations for careers may be established."²³

PART II. WORKFORCE ADAPTATION: TRAINING AND UPSKILLING CASE STUDIES

Although the public sector has historically convened workforce stakeholders when faced with structural changes, a variety of entities working independently and cooperatively play a vital role in training the workforce and coordinating actors. This section evaluates case studies of innovative initiatives led by the public, private, and nonprofit sectors, and partnerships among these groups that are reshaping the workforce to better prepare for skilled jobs in California's innovation economy.

STEM Core: Equipping Community College Students for STEM Careers

California's community college system plays a critical role in educating and training the state's workforce. The community college system offers associate degrees and short-term job training certificates in over 175 fields and trains more than 100,000 individuals each year in industry-specific skills. The impact of these institutions is particularly apparent in high-demand industries such as health and public safety: Community colleges educate 70 percent of the state's nurses and train 80 percent of firefighters, law enforcement personnel, and emergency medical technicians.²⁴

22 Gregor Aisch, Larry Buchanan, Amanda Cox, and Kevin Quealy, "Some Colleges Have More Students From the Top 1 Percent Than the Bottom 60. Find Yours." *The New York Times*, January 18, 2017, <https://www.nytimes.com/interactive/2017/01/18/upshot/some-colleges-have-more-students-from-the-top-1-percent-than-the-bottom-60.html>.

23 The Select Committee on the Master Plan for Higher Education, page xi.

24 "Key Facts," California Community Colleges, accessed December 10, 2019, <http://californiacommunitycolleges.cccco.edu/PolicyInAction/KeyFacts.aspx>.



Community colleges also provide an economically and demographically diverse student body with high-quality education and training programs at a lower cost relative to four-year institutions. Additionally, with over 100 campuses and close relationships with local education and industry, these colleges can leverage the capabilities of regional industry clusters to develop industry-aligned programs and ensure a competitive local labor pool.

One such initiative—the STEM Core—is a consortium of major engineering and science employers, including national labs, NASA, and select community colleges in the Western US focused on removing barriers to careers in science, technology, engineering, and mathematics (STEM) facing remedial college students.²⁵ The inability of students to complete foundational math and English courses and progress to more advanced coursework presents a specific barrier to entry into STEM careers, which require a core competency in these areas.²⁶

The initiative has developed a first-year STEM Core curriculum focused on achieving proficiency in calculus, computational understanding, and technical English and communication skills. The core, tailored to match partner employer needs, features cohort-based learning communities with intensive academic and social support. The program also integrates work-based learning through paid internships and research opportunities at STEM employers.

STEM Core participants highlight the importance of soft skills and applied work experience to employers. Internship and apprenticeship opportunities have the additional benefit of reinforcing for students the importance of what they are studying and connecting them to mentors who can support and guide them through the education and employment process. STEM Core partners with local and national employer partners, including NASA, national labs, and aerospace and software companies, among others, to facilitate these internships.

This initiative has the potential to increase the diversity of hires available to STEM employers while facilitating access to skilled, high-paying jobs for those enrolled in remedial coursework. Ninety percent of the STEM Core student population is low-income, 57 percent are first-generation college students, and 44 percent are Latino. Approximately 250 students have completed the first phase of the program, and the initiative aims to serve 750–1,000 students each year as it continues to grow.

25 A 2016 report by the Public Policy Institute of California found that 80 percent of the state's community college students were placed in at least one remedial math or English course, or both.

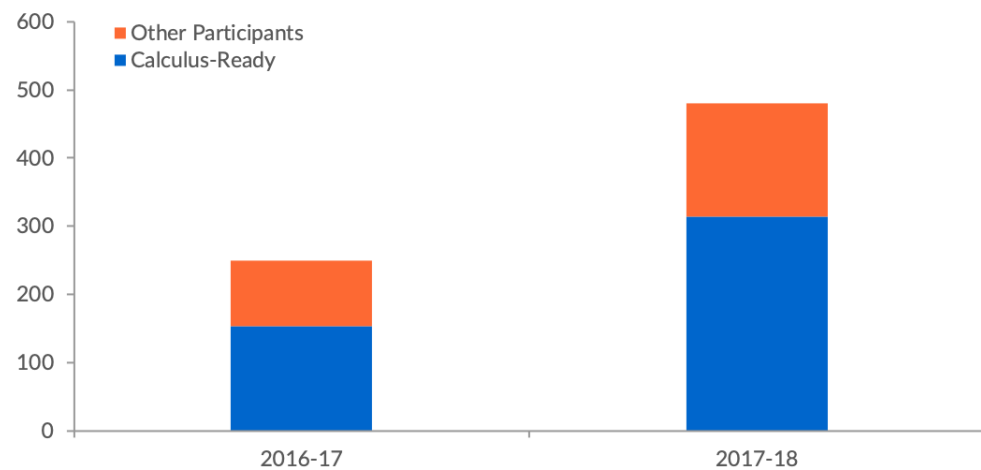
26 "The STEM Core Network," Growth Sector, accessed December 10, 2019, <http://growthsector.org/thestemcorenetwork/stem-core/>



Outcome data from the first five years of the program indicate that 66 percent of students progress from intermediate algebra to calculus in one academic year, compared to the statewide average of 4 percent.²⁷ After an initial implementation phase funded by the National Science Foundation, among others, the STEM Core has expanded its reach through partnerships with the San Jose Evergreen Community College District and its Community College Center for Economic Mobility, and the Stanford Educational Leadership Initiative.

Figure 6: Over Half of STEM Core Participants Are Calculus-Ready in One Year

Students Participating in STEM Core Program, 2016-18



Source: Growth Sector, 2019

²⁷ "The STEM Core Network."



IE-Squared: Assessing Regional Assets and Needs in Innovation Industries

The Inland Empire counties of Riverside and San Bernardino are home to significant assets in high-tech industries, including information technology, clean tech, and biotech. However, the region still lacks a body for high-level coordination and communication in both policy and investment. Last May, the Milken Institute hosted a strategic planning session in partnership with the University of California Riverside Center for Social Innovation focused on identifying assets and potential investments and assessing critical gaps within the ecosystem and the region's innovation economy.

Collectively, the participants in this planning process constitute a regional partnership known as the Inland Empire Innovation Ecosystem (IE-Squared) initiative, which is a cross-sector collaboration that brings together the public sector, business leaders, academics, and research partners to drive investment in the Inland Empire's biotech, clean tech, and information technology industries.²⁸

The May 2019 planning session began with a conversation about the assets and initiatives currently in place. The K-12 and higher education pipelines are working together to build career pathways and grow apprenticeships focused on jobs currently in the region while developing programs to deliver a skilled workforce for companies locating to the region. The region's approach to human capital development is similarly well-coordinated and preparing for emerging opportunities, including the opening of the new California Air Resources Board headquarters in Riverside.

Participants also identified the University of California Riverside (UCR) and its affiliated EPIC Small Business Development Center as crucial to the region's innovation ecosystem. The EPIC center is a one-stop shop providing entrepreneurs with the necessary resources and technical expertise to start a tech business or scale an existing business, including mentors and expertise on the process of starting and growing companies.

The discussion then turned to the elements preventing the regional cluster from achieving its maximum potential. Missing components included facilitators, C-level talent, incubators, government and nonprofit support, service providers, and capital. While UCR and the Epic Small Business Development Center provide critical infrastructure to the ecosystem, there is a need to scale up to match the geographic size of the Inland Empire.

²⁸ Tess Eyrich, "Want to See California on the Rise? Look Inland," *UC Riverside News*, June 24, 2019, <https://news.ucr.edu/articles/2019/06/24/want-see-california-rise-look-inland>; "Inland Empire Initiative Map," UC Riverside Center for Social Innovation, accessed December 10, 2019, <https://socialinnovation.ucr.edu/inland-empire-initiative-map>.



Other major challenges noted by session participants included access to capital due to a lack of angel investors in the region. Funders look for existing executive talent, a critical mass of projects in development, and economic specialization. In order to arrive at a critical mass of projects, the region will also require additional service providers. As the IE-Squared initiative continues to take shape, it hopes to provide solutions for the challenges presented by coordinating among regional actors.

Milken Future of Work Convenings: Bringing Together Employer-Driven Training Initiatives

In a series of meetings dedicated to identifying workforce challenges and solutions in California and beyond, the Milken Institute brought together cross-industry leaders to discuss strategic investments in human capital and collaboration, with a particular focus on underserved communities and populations. These conversations highlighted a growing consensus among industry, academia, and government on the most pressing issues to be addressed:

- The future of work requires a shift to a mindset of continuous learning in light of growing automation and innovation. Technologies are coming online at quick rates. Workers will need to learn new skills and adapt to new technologies to ensure qualification for multiple jobs over the course of their lives.
- To better prepare the next generation of workers, we need to consider how the tuition-based classroom model prevents students from completing degrees within four years, saddles them with additional debt, and underequips them for a competitive entrance into the labor market.
- It is crucial to establish organic partnerships between industry leaders and educational institutions to help eliminate barriers to entry.
- More and better data are needed to facilitate strategic investments in education and training programs, as well as to provide a concrete understanding of outcomes for students and workers considering a degree or credential program.

The meeting also highlighted how employer-driven training initiatives working in partnerships with local education, government, and nonprofit partners are helping California's workforce adapt to a changing world of work. To do this, successful programs begin outreach in the K-12 education system, focusing on building skills and knowledge directly relevant to high-growth competitive industries. This effort is coupled with work-based learning experiences that integrate soft skills such as communication and critical thinking. These programs may also include articulated or concurrent degree programs with institutes of higher education, enabling participants to obtain high school diplomas, college degrees or credits, industry certifications, and/or paid work experience.



In the transportation sector, for example, LA Metro and LA County are developing the Metro Transportation School, a specialized academy in South Los Angeles, to guide students towards transit-oriented careers. This initiative is part of LA Metro's cradle-to-career approach to workforce development, which is intended to create a pipeline of equipped infrastructure workers and fill an expected workforce gap—almost 50 percent of metro workers will be eligible for retirement in the next five years. The school will specifically target youth aged 12–18 currently receiving services from or at risk of entering the county's child welfare system, probation/juvenile justice system, or homeless services.²⁹

Another innovative initiative, the Wonderful Agriculture Career Prep Program (Ag Prep) is a tuition-free early college program at eight Central Valley high schools. Students participating in the Wonderful Company's Ag Prep complete a rigorous core curriculum in agricultural business management, agricultural technology, or plant science and take courses taught by college professors while in high school, earning from 40 to 60 free college credits. Graduates of the program can advance directly to either a four-year institution or job with a guaranteed salary.³⁰

Of Ag Prep's nearly 1,000 enrolled students, at least 80 percent are first-generation or low-income.³¹ And nearly 80 percent of current program 12th graders are on track to meet four-year college entrance requirements, while 70 percent are on track to complete an associate of science in agriculture degree upon high school graduation.³² Of those who move on to a four-year college, 75 percent graduate with a degree.³³

These employer-led training initiatives are being driven by industry partners that recognize the return on investment on local human capital while ensuring they have the workforce they need. Panelists also mentioned current efforts to collect feedback and student outcome metrics, which will enable them to better understand the successes and challenges of these training programs in helping participants reach gainful employment and economic mobility.

29 Los Angeles County Metropolitan Transportation Authority, "Metro Transportation School Final Feasibility Report," August 14, 2018, http://libraryarchives.metro.net/DB_Attachments/2018-0358_Attachment_E_Summary_of_Final_Report.pdf.

30 "Wonderful Agriculture Career Prep (Ag Prep)," Wonderful Education, accessed December 10, 2019, <https://www.wonderfuleducation.org/agriculture-career-prep>.

31 Nadine Ono, "Early College Partnership Closing Central Valley Skilled Agricultural Worker Gap Earns Summit Award," *CA Forward*, November 1, 2019, <https://cafwd.org/reporting/entry/early-college-partnership-closing-central-valley-skilled-agricultural-worke>.

32 "Wonderful Agriculture Career Prep (Ag Prep)."

33 "Social Responsibility: Education," Wonderful Company, accessed December 10, 2019, <https://www.wonderful.com/social-responsibility/education.html>.



Online Education: Enhancing Adult Learning by Leveraging Technology Solutions

In 2011, the online education market experienced an explosion in free, digital courses. These online courses were provided by digital education platforms—including Coursera, Udacity, and Udemy—and established to make higher education and skill-building more widely available to adults. While the industry has remained committed to this core mission, the platforms have recently begun moving into workforce training partnerships with employers.

Sample Partnerships

Below is a brief overview of the range of these employer partnerships:

a. **Coursera:** Coursera was launched in April 2012 by two Stanford University computer science professors to make university courses available to a broad audience. Today, Coursera’s offerings span a range of courses from various universities, complete with a credentialing system of “stackable credentials,” representing skills gained through taking one or a series of courses. It also offers master’s degrees—the first in computer science with the University of Illinois and, more recently, one with the University of Pennsylvania in computer and information technology.

Coursera’s employer partnerships have taken two forms. First, employers have used Coursera to upskill their workforces. Second, firms have produced content and posted on Coursera’s site, both for their own workforces and for outside workers. One example is the Google IT Support Professional Certificate, developed by Google staff and designed to provide beginner learners with entry-level job readiness in 8–12 months. The certificate prepares workers for jobs at Google and other firms, such as Bank of America and Walmart, whose work skills Google studied in crafting its certification program.

b. **Udacity:** Like Coursera, Udacity began as a platform for online education, although with a greater focus than Coursera on technological skills. Udacity currently offers more than 30 nanodegrees, or training in a targeted tech skill area such as data science, artificial intelligence, blockchain, self-driving cars, robotics, and virtual reality.

While Udacity continues its general education role, it has adapted to focus on workforce training, partnering with employers to continually train and develop incumbent workers. Recent partnerships include the new AT&T Nanodegree program—an effort to retrain and develop worker proficiency in data science, machine learning, programming, and software development—and a partnership with Credit Suisse to develop a data science team through an internal upskilling



initiative.³⁴ AT&T has noted it will accept the nanodegree as a credential for entry-level jobs and reserved 100 paid internship slots for graduates.³⁵ Udacity also established a training with the Nevada Governor’s Office of Economic Development to retrain workers in Reno as full-stack web developers.³⁶

c. **Udemy:** Udemy also sees a market for short-term, skill-based training deemed necessary by employers. Udemy initially launched in early 2010 as an online education platform that drew content from higher education institutions and individual content providers. While some courses provide a certificate of completion, the site largely eschews credentials and degrees on the grounds that employers are more interested in skills that can be demonstrated rather than credentials.

Udemy has since expanded into employer upskilling of incumbent workforces through its Udemy for Business program. Udemy’s marketing to employers relies on its ability to curate the thousands of courses to find the best fit for upskilling. Udemy utilizes user feedback and its own data analytics to find the courses and the course progression companies have found most valuable for upskilling. Udemy counts over 1,000 employer customers as of 2018, including Lyft, PayPal, Pinterest, and Volkswagen. Lyft, for instance, uses Udemy for Business to provide employees with project management instruction, data science skills, and education on how teams within Lyft operate.³⁷

Takeaways

While the EdTech Workforce firms differ significantly in their approaches and methods, they bring a number of strengths that hold the potential to improve the public workforce system’s performance in training, placement, and retention.

Flexibility. Each of these firms has rapidly expanded employer partnerships in the past few years. These partnerships have taken several inter-related forms: partnerships where employers actively shape the training curriculum in real time, partnerships where employers hire graduates based on training, and partnerships where employers upskill existing employees.

Employer-developed training content, constantly upgraded in real time. Though

34 Michael Bernick, “Udacity’s Next Strategies for the Upskilling Market,” *Forbes*, August 1, 2018, <https://www.forbes.com/sites/michaelbernick/2018/08/01/udacitys-next-strategies-for-the-upskilling-market/#54d4f6c75afd>.

35 National Network, “Nanodegree: Transforming IT Training by Making It Affordable, Relevant and Available Online,” accessed December 10, 2019, <http://nationalnetwork.org/wp-content/uploads/2016/02/ATT-Nanodegree-Model.pdf>.

36 Christopher Watkins, “Future of Work: Connecting Learning to Jobs in Nevada,” *Udacity Blogs*, May 18, 2017, <https://blog.udacity.com/2017/05/future-of-work-connecting-learning-to-jobs-in-nevada.html>.

37 “How Lyft Gets Employees the Skills They Need and Ensures Engagement with the Whole Company,” *Udemy Business*, accessed December 10, 2019, <https://business.udemy.com/case-studies/lyft/>.



community colleges and workforce intermediaries work with employers in curriculum development, they rarely have the resources of private-sector firms to upgrade curriculum constantly in real time. Furthermore, private-sector firms are now partnering with employers to develop employer-product linked content for the wider ecosystem outside of a specific firm. The completion of the Google IT Support Professional Certificate through Coursera, for example, allows entrance into the wider information technology field.

Alternative forms of credentialing focused on skills. The companies all incorporate a recognition that traditional degrees mean less and less to employers in the hiring and advancement processes. They have developed alternative forms of credentialing that, even in the very crowded market of credentials, are finding employer approval.

PART III. DEVELOPING THE ROADMAP AND PREPARING THE STATE FOR THE FUTURE OF WORK

California's history has shown the state's willingness to confront structural challenges head on with bold strategy and planning. California's nonprofit, private, and local organizations have similarly demonstrated an ability to adapt through innovation and coordination. What is necessary, then, to chart a path forward?

For one, when considering the growing role of automation and the associated rise in demand for technical skills across industries, current systems must prepare students for employment by providing the skills employers need. In addition, attention to improving access and affordability is paramount for equitable educational and employment outcomes.

State officials already highlighted the significance of enhanced access. In 2017, the state legislature established an Assembly Select Committee to update the Higher Education Master Plan. At the first hearing in August 2017, the committee chair, Assemblyman Marc Berman, explained, "I have complete confidence in the high quality, but I think we've lost a little bit of the accessibility and a lot of the affordability." The state's current workforce plan, "Skills Attainment for Upward Mobility: Aligned Services for Shared Prosperity," sets out "enabling upward mobility for all Californians" as a key objective, explaining that "workforce and education programs need to be accessible for all Californians [to] ensure that everyone has access to a marketable set of skills."³⁸

38 California Workforce Development Board, "Skills Attainment for Upward Mobility: Aligned Services for Shared Prosperity," 2015, <https://cwdb.ca.gov/wp-content/uploads/sites/43/2017/12/Unified-State-Plan-plain-text.pdf>.



To improve access to education and employment, California leaders will need to embrace and deploy a multipronged approach that restructures the education pipeline and supports place-based investment throughout the state via new funding sources. This approach will require a model of continuous learning and a reshaped governance model adopting the following principles:

Revise California’s Higher Education Master Plan and the Alignment of the Higher Education System

State leaders already recognize that higher education’s role in accessing the labor market needs to expand. Calbright, the state’s 115th community college, launched in October 2019, specifically targeting working adults. The college utilizes online education, mobile apps, and real-world apprenticeships to address deficiencies in adult learning and prepare students for careers in high-growth fields, including medical coding, information technology support, and information security.³⁹

Beyond this investment, state leaders should consider the following to adapt and enhance the higher education pipeline:

Leverage new models of skills-based learning. The market for alternative certifications is competitive and rapidly growing. One indication of the acceptance of the credentials by these firms is the expansion of employer partnerships. A main selling point to employers is the ability of online firms to curate hundreds, even thousands, of course offerings to target the skills sought by the employer.

Additionally, federal workforce funds have decreased over the past decade, and California Local Workforce Development Boards, community colleges, and other workforce providers are giving greater consideration to how to stretch training and placement funds. These online firms, like other online education approaches, hold promise in the scaling of training. The Udacity nanodegrees, for example, are in the range of \$1,000 for the full series of courses.

Colleges and universities should not reinvent the wheel. Institutions should expand collaboration with these public-private online trainings with established high competencies. One possibility is to offer a certificate or associate degree with the completion of an established nanodegree program. For example, Santa Monica College offers a 13-unit, fully online certification program in cloud computing based on content from Amazon Web Services (AWS) and AWS Educate. Students who complete the program are equipped to pursue careers in cloud computing and information technology, one of the highest paying information technology fields.⁴⁰

39 “Curriculum,” Calbright College, accessed December 10, 2019, <https://www.calbright.org/working-adults/curriculum/>.

40 “Cloud Computing—AWS,” Santa Monica College, accessed December 10, 2019, <http://www.smc.edu/AcademicPrograms/CSIS/Pages/Cloud-Computing.aspx>.

Colleges and universities should not reinvent the wheel.



At the same time, research from Columbia University suggests that participants in Massive Open Online Courses (MOOCs) already tend to possess higher education and jobs but feel the need to acquire new skills to continue progressing in their careers. The evidence also seems to indicate that online education best supports low-income students when directly tied to work.⁴¹ Using online providers to train underserved, low-income, or less-educated audiences will require intentionality. Specifically, courses will need to target or be designed by specific employers, address differences in participant preparation levels, and provide funding for courses that are not free.⁴²

Expand the community college system's integration with industry. From an equity perspective, community colleges are central points of action and opportunity. These institutions serve a demographically diverse student body, including many first-generation college students, providing high-quality education and training programs at a lower cost than four-year institutions.

However, when comparing the number of degrees and certificates awarded by the community college system to targeted growth industries across the state, the scope of the disconnect between industry and academia comes into sharp focus. The table below shows the estimated changes for the latest 10-year state-level employment projections for industries the state has targeted. At the state level, the industry data do not have a breakdown by education level, but it is evident that the community college system will only have a marginal effect for most of the industries targeted by the state government.

41 Eduardo Porter, "A Smart Way to Skip College in Pursuit of a Job," *The New York Times*, June 17, 2014, <https://www.nytimes.com/2014/06/18/business/economy/udacity-att-nanodegree-offers-an-entry-level-approach-to-college.html>.

42 Fiona M. Hollands and Devayani Tirthali, "MOOCs: Expectations and Reality," Center for Benefit-Cost Studies of Education, May 2014, <https://files.eric.ed.gov/fulltext/ED547237.pdf>, pg 167.



Table 1: Employment Projections and Degree Completions for Targeted California Industries (2016-2026)

Title	Employment Projection Estimate (2026)	10-year Estimate of Degree Completions	
Advanced Manufacturing	114,300	4,384	-109,916
Advanced Transportation and Logistics	-1,400	2,853	4,253
Agriculture, Water, and Environmental Technologies	11,900	1,450	-10,450
Business and Entrepreneurship	143,000	47,658	-95,342
Education and Human Development	135,800	9,353	-126,447
Energy Construction and Utilities	158,000	-898	-158,898
Global Trade	27,300	38	-27,262
Health	545,500	3,990	-541,510
Information and Communication Technologies—Digital Media	131,700	12,001	-119,699
Life Sciences—Biotechnology	55,300	814	-54,486
Public Safety	104,400	36,676	-67,724
Retail, Hospitality, and Tourism	252,300	959	-251,341

Source: State Employment Development Department and Milken Institute, 2019.

Although colleges do receive funding incentives based on students completing a certain number of career education units or other noncredit milestones, more weight is placed on students attaining credentials and transferring to four-year institutions. The creation of an organic relationship between the community college system and industry will require a reorganization of these incentives (more detail is offered in the next section). This integration, however, would open access to the labor market and reduce the burden of student debt that accompanies the reliance on colleges and universities to create talent.



Academic and industrial alignment will also require better data. Tracking student progress through unit completion and credential attainment is important in gauging the impact of community college career education programs. California currently lacks a longitudinal data system able to track student education and employment outcomes across K-12 schools, public and private two- and four-year institutions, and workforce systems. Although there is widespread agreement that more needs to be done to prepare Californians for jobs that will increasingly require some post-secondary education and training, the data do not allow for students, educators, and policymakers to assess the employment outcomes of educational programs comprehensively.

Catalyze Workforce and Employer Integration

Across the country, the future of work is taking shape under rapid advancements in technology and automation. Ensuring California's workforce is keeping pace with shifting industry trends remains a challenge as leaders contemplate the changing dynamics of human labor. In response, it is crucial to establish partnerships among industry leaders and academia focused on enhancing access to education opportunities in anticipation of the skills necessary to compete under rapidly evolving workforce needs.

Incentivize employer-led partnerships between higher-education institutions and private companies, and facilitate scale through data collection. Employer-led training initiatives can provide students with work experience and job training, which improves both workforce readiness and job placement. These initiatives are being driven by industry partners who recognize the return on investment of local human capital development, ensuring the firms a future workforce.

Curriculum developed in partnership with industry partners also ensures the skills students are learning are directly relevant to high-growth industries in the state. Embedding articulated and concurrent degree programs in public schools and in regions of the state that have traditionally lagged in educational attainment and training also helps eliminate barriers to entry, as with Wonderful's Ag Prep initiative.

To scale up these investments, there is a need to collect data on student outcomes and employer feedback. Institutions and firms should work in partnership to focus data collection on student outcomes, including credentials attained, employment outcomes, and, most importantly, specific skillsets gained. This measurement will allow prospective students to determine the value of credentials and training through program outcomes. From an industry perspective, precise information on the specific skills needed to fill positions will facilitate more effective and targeted curriculum and program development.



Coordinate regional workforce development actors, programs, and assets. In a patchwork of systems and providers, navigating workforce development across the state encompasses numerous entities, and finding alignment among all parties can be challenging. In any given region, there are employers, educational institutions, multiple layers of government, nonprofit organizations, and advocacy groups. These groups are striving to meet the needs of employers in real time while serving a diverse incumbent and prospective workforce. Coordination and centralization would be more effective from an industry and employer engagement perspective, as in the Inland Empire Innovation Ecosystem case study. This convening role can be filled by public-sector partners (for instance, county government) or relevant industry or economic development nonprofits.

One example is the Los Angeles Economic Development Corporation (LAEDC), a regional economic development organization serving Los Angeles County. LAEDC has proposed the establishment of a talent hub for local companies and community colleges to collect employer feedback on desired skills and labor market data in one place. This hub would provide a clear channel of communication between industry and 19 education providers.⁴³ LAEDC is also working on compiling data on skills gaps and workforce needs projections with partners in industry and academia.

Seed Regional Competitiveness Through Core Competencies

California's innovation-based economy is not a by-product of private firms developing and commercializing new technologies but of deliberate public investments made over time that cultivate development in talent and research. California should take bold steps to maintain these assets and advantages while enhancing its capacity for training and innovation around the state. By cultivating environments that allow firms to draw from a robust pool of highly skilled workers, leaders can continue to leverage the economic growth benefits associated with technology and innovation while addressing the lack of equity and economic mobility in underserved populations.

⁴³ Center for a Competitive Workforce, "Strong Workforce Regional Project Update: Los Angeles Region," May 2019, <https://laedc.org/wp-content/uploads/2019/05/CCW-Progress-Report-FINAL-WEB-5.6.19.pdf>.



CASE STUDIES

Agriculture: Spearheaded by the Wonderful Company, the Agriculture Career Prep Program (Ag Prep) established high school programs in the agriculture-rich Central Valley that equip graduates with technical and soft skills along with college credit. This enables them to advance directly to a four-year institution at the junior level or to a guaranteed job with the Wonderful Company. The Ag Prep program serves the specific needs of its Central Valley community and provides access to higher education and entry-level careers to a historically underserved population.

Aerospace: Northrop Grumman partnered with Antelope Valley College, Goodwill Industries, and the City of Palmdale to design a technician training program to reduce job training costs. The curriculum prepares a diverse body of students for careers in aircraft fabrication and assembly. Upon completion, students have a guaranteed round of interviews with Northrop Grumman and other aerospace companies in the region.

Transportation: With dozens of projects underway and a workforce rapidly approaching retirement age, LA Metro has created a workforce development initiative intended to increase the pool of skilled workers available for hire. In partnership with the County of Los Angeles, LA Metro is developing a specialized Transportation School that guides students in grades 9–12 towards transit-oriented careers through a curriculum based on Science, Technology, Engineering, Arts, and Math (STEAM) skills.⁴⁴

Entrepreneurship: UCR and its affiliated EPIC Small Business Development Center have created a one-stop shop to provide entrepreneurs the necessary resources to start and grow companies, including mentors and expertise.

Public-Sector Led Training: GenerationGo!, a county-wide program established by the San Bernardino Workforce Development Board, integrates work-based learning opportunities with high school curriculum in targeted industries, including utilities, construction, logistics and transportation, and manufacturing.⁴⁵ Riverside County offers a similar program coordinated through the county Office of Education Career Technical Education Unit.⁴⁶

44 Jose Ubaldo, “Metro and LA County Partner on Transportation School to Create the Next Generation of Workers,” *The Source*, June 18, 2018, <https://thesource.metro.net/2018/06/18/metro-and-l-a-county-partner-on-transportation-school-to-create-the-next-generation-of-workers/>.

45 “Generation GO!: High School Seniors Begin County Internships,” *San Bernardino County Wire*, February 14, 2019, <http://wp.sbcounty.gov/cao/countywire/?p=4188>.

46 “Career Technical Education (CTE) Introduction,” Riverside County Office of Education, accessed December 10, 2019, <https://www.rcoe.us/career-technical-education/>.



The STEM Core initiative presents an example of a targeted industry engagement program designed to increase access to a high-growth industry for an underrepresented population with significant barriers to employment. Regional partners came together to create pathways for an economically disadvantaged population in the community while meeting the needs of employers with high-skill job demands. The partners also leveraged the resources of the Department of Energy (DOE) as a force multiplier to achieve an impact that resonates at the national level.

The STEM Core initiative illustrates how partners at the local, regional, and national levels can come together to achieve outcomes that support broader public policy initiatives while having a significant impact at the local level. STEM Core program supporters from the DOE referenced the federal government's five-year strategic plan for STEM education, and efforts are underway at the national level to support the STEM workforce of the future and increase diversity, equity, and inclusion.⁴⁷ National labs, which fall under the aegis of the DOE, have also been key partners in the STEM Core initiative.

Currently, STEM Core cohort programs have enrolled 334 community college students at 13 colleges in California. Institutions, employers, and other organizations seeking to emulate and expand on the successes of the STEM Core program should: (a) structure specific industry collaboration and supportive training models to place students into internships and (b) layer supplemental instruction when necessary to mitigate current barriers associated with remediation instruction.⁴⁸

CONCLUSION

In preparing California for the future of work, the keys to cultivating a 21st century workforce are rooted in the state's legacy. Leaders must leverage the benefits of the state's innovation-based economy and deploy strategic planning to align partnerships between industry and academia. By establishing an academic pipeline that supports a continuum of workforce needs, public leaders will enhance access to an array of upskilling programs throughout the broader economy.

The new workforce dynamic is already taking shape in different forms and structures around the state and beyond. By harnessing strategic investments in technology and collaboration among industry and education providers, especially in underserved communities and populations, we will reaffirm the California dream for a new generation.

⁴⁷ Committee on STEM Education of the National Science & Technology Council, "Charting a Course for Success: America's Strategy for STEM Education," December 2018, <https://www.whitehouse.gov/wp-content/uploads/2018/12/STEM-Education-Strategic-Plan-2018.pdf>.

⁴⁸ "Award Abstract #1649381: STEM Core Initiative," National Science Foundation, accessed December 10, 2019, https://www.nsf.gov/awardsearch/showAward?AWD_ID=1649381&HistoricalAwards=false.

In preparing California for the future of work, the keys to cultivating a 21st century workforce are rooted in the state's legacy.



APPENDIX: A SNAPSHOT OF 21ST CENTURY WORKFORCE EDUCATION AND TRAINING PROGRAMS⁴⁹

Achieving equity in a diverse 21st century workforce landscape entails developing programs targeted to a wide spectrum of needs. Highlighted below are examples of programs that serve different segments of the population and seek to provide greater access to the education and training that are essential to securing well-paying jobs and economic mobility.

Target Population: Prospective Workforce

In recognition of the fact that a high school diploma is increasingly insufficient to obtain a well-paying job, many innovative workforce and education training programs that target K-12 students include a higher education component. Articulated and concurrent degree programs establish partnerships between high schools and two- and four-year institutes of higher learning that enable students to obtain high school diplomas and college degrees and/or certificates on an accelerated timeline, often supplemented by work-based learning that gives them an additional edge when entering the workforce or pursuing additional education and training.

⁴⁹ Prepared by Jennifer Lovett and Ivana Wang.

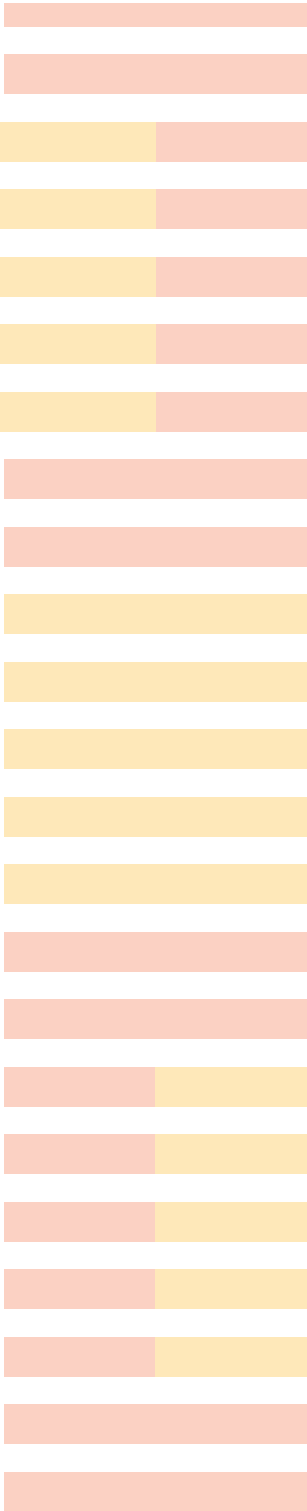


Program Name	Provider(s)	Provider Sector	Region	Program Description	Impact	Sources
Pathways in Technology Early College High Schools (P-TECH)	K-12, higher education, and industry partners	Public-private partnership	Select locations in US and abroad	Developed by IBM in collaboration with educators and policymakers, P-TECH is a six-year integrated program of high school and two additional years of study. Students graduate with a high school diploma and associate degree in a competitive STEM field and participate in work-based learning opportunities throughout the program.	<ul style="list-style-type: none"> • 110 schools in eight states and four countries • 185 graduates 	P-Tech, "Impact: Results," accessed December 10, 2019, http://www.ptech.org/impact/results/ .
CareerWise Colorado	K-12, higher education, and industry partners	Public-private partnership	Colorado	CareerWise is a modern youth apprenticeship program. Starting in their junior year of high school, students split their time between the classroom and paid on-the-job training in pathways including advanced manufacturing, information technology, financial services, business operations, health care, and education. In addition to a high school diploma, the program offers students the opportunity to earn an industry certificate and free college credit.	<ul style="list-style-type: none"> • 250 students statewide • 70 participating companies • 18 education partners 	Careerwise Colorado, "Partners & Funders," accessed December 10, 2019, https://www.careerwisecolorado.org/ourstory/partners/ . Jenny Brudin, "Colorado Wants to Enroll 1 in 10 of All Students in Apprenticeships by 2027," Colorado Public Radio, September 6, 2018, https://www.cpr.org/show-segment/colorado-wants-to-enroll-1-in-10-of-all-students-in-apprenticeships-by-2027/ .
California Cloud Workforce	K-12, higher education, and industry partners	Public-private partnership	Greater Los Angeles	The California Cloud Workforce initiative seeks to expand common curriculum and a regional career pathway program and certificate in cloud computing that includes high schools and 19 community colleges. A first-of-its-kind regional collaboration, curriculum was developed in partnership with Amazon Web Services (AWS) and its AWS Educate program.	<ul style="list-style-type: none"> • 19 participating community colleges in Greater Los Angeles 	California Cloud Workforce, "Strong Workforce Regional Project," accessed December 10, 2019, http://www.smc.edu/AcademicAffairs/Workforce/Documents/CA-Cloud-Project-Description.pdf .
Wonderful Agriculture Career Prep (Ag Prep)	K-12, higher education, and industry partners	Public-private partnership	California's Central Valley	The Wonderful Company's Ag Prep program brings together public middle and high schools, community colleges, California State University campuses, and ag-based companies to streamline student pathways into agriculture careers. Participating high school students graduate with college credit that enables them to earn an associate degree and transfer into a four-year university as a junior or enter the workforce with a guaranteed salary.	<ul style="list-style-type: none"> • 124 graduates from first cohort • Seven high schools in California's Central Valley 	Thad Nodine, "The Sky's the Limit for Ag Prep Graduates," Jobs for the Future, Spring 2019, https://static1.squarespace.com/static/59a09484ccc5c50e494ed921/t/5d487104343b320001a0d2ee/1565028615380/JFF_1st+Grad_FINAL_Online.pdf . "Wonderful Agriculture Career Prep (Ag Prep)," Wonderful Education, accessed December 10, 2019, https://www.wonderfuleducation.org/agriculture-career-prep .



Target Population: Incumbent Workforce

There is increasing recognition that the future of work will require employees to learn new skills over the course of their careers. Many employers are working with education and government partners to develop upskilling and training programs that target working adults, providing flexibility and enhanced economic mobility across a range of industries. Other programs offer an accelerated training timeline that allows workers with a basic level of education and training to rapidly gain the skills they need to transition to new industries.





Program Name	Provider(s)	Provider Sector	Region	Program Description	Impact	Sources
Intro to Manufacturing Technology Bootcamp	East Los Angeles College and UCLA Extension	Higher education	Los Angeles	Developed in partnership with regional economic development organizations, the bootcamp is a five-week accelerated training program that grants students a certificate of completion and equips them with the hard and soft skills necessary to obtain positions in the manufacturing industry.	<ul style="list-style-type: none"> Pilot program offered at one community college location in Los Angeles 	AMP SoCal, "Intro to Manufacturing Technology Bootcamp," accessed December 10, 2019, https://ampsocal.usc.edu/how-we-help/manufacturing-technology-bootcamp/ .
Lives Empowered	State workforce boards, economic development groups, education partners, and private employers	Public-private partnership	Colorado	Lives Empowered targets the retail sector in the state of Colorado. The program will fund 10 partnerships across the state that will convene workforce boards, economic development groups, education partners, and private employers to develop upskilling and training programs to increase economic mobility for frontline retail workers.	<ul style="list-style-type: none"> Pilot program supporting 10 statewide retail sector partnerships 	Colorado Workforce Development Council, "Lives Empowered," accessed December 10, 2019, https://www.colorado.gov/pacific/cwdc/lives-empowered .
Amazon Career Choice	Amazon and accredited education partners	Private	International	Amazon offers the Career Choice program to its hourly associates as a means to foster their continued learning and career growth. The company will cover 95 percent of tuition, fees, and required textbooks for coursework in well-paying, high-demand industries such as transportation, health care, mechanical and skilled trades, and IT. The company has built onsite classrooms in its fulfillment centers to accommodate demand from workers.	<ul style="list-style-type: none"> 16,000 participants from 10 countries 	Amazon, "Career Choice," accessed December 10, 2019, https://www.aboutamazon.com/amazon-fulfillment/working-here/career-choice .
Guild	Nonprofit higher education institutions	Private	United States	Guild helps companies design a tuition reimbursement program that enables employees to access a network of nonprofit higher education partners that offer programs targeted toward working adults. Flexible programs and support offer a wide range of options for employees and offer data-driven results for employers designed to improve retention and recruitment efforts and overall ROI on education benefits.	<ul style="list-style-type: none"> Provides access for over 3 million employees 	Guild, "How it Works," accessed December 10, 2019, https://www.guildeducation.com/why-guild/how-it-works/ .



Target Population: Disconnected Workforce

Certain segments of the population have been disconnected from the workforce and need additional support to obtain well-paying jobs. Workforce programs that have been developed to reach these populations are highlighted below.

Program Name	Provider(s)	Provider Sector	Region	Program Description	Impact	Sources
The Uniquely Abled Project (UAP)	Community colleges, state and local governments, and nonprofit partners	Public-private partnership	California and Massachusetts	The UAP collaborates with the business community to place individuals with high-functioning autism into well-paying jobs across a range of industries and provide post-hire support. Through its academy program, the UAP trains participants for entry-level CNC machinist positions and provides job placement and post-hire support.	<ul style="list-style-type: none"> • 10 graduates from first cohort • Five participating colleges 	ToolingU, "A Unique Solution to Tackle the Shortage of CNC Machinists," accessed December 10, 2019, http://uniquelyabledproject.org/wp-content/uploads/A-Unique-Solution-to-Tackle-the-Shortage-of-CNC-Machinists.pdf .
Adobe Digital Academy	Private training partners	Private	San Francisco, Salt Lake City, and Austin	Adobe Digital Academy serves underrepresented communities in tech by providing scholarships for immersive web development or user experience design courses. Students receive targeted feedback and guidance throughout the program and are given the opportunity to intern and be considered for full-time positions with Adobe.	<ul style="list-style-type: none"> • Over 100 graduates 	Adobe, "Reskilling and Upskilling Through Modern Apprenticeships," accessed December 10, 2019, https://www.adobe.com/corporate-responsibility/youth-creativity/digital-academy.html .
Biocom Institute Veterans Initiative	Biocom Institute	Private	San Diego	Biocom Institute advocates on behalf of California's life science sector, representing the interests of over 1,200 members across a range of issues, including workforce development and public policy. The institute's Veterans Initiative is designed to help connect veterans to the life science industry through workshops, mentoring, and a career fair.	<ul style="list-style-type: none"> • Open to veterans in San Diego County 	Biocom, "Veterans," accessed December 10, 2019, https://www.biocom.org/what-we-offer/biocom-institute/veterans/ .
Year Up	Higher education and industry partners	Public-private partnerships	United States	Year Up is a one-year intensive training program designed to connect motivated young adults between the ages of 18 and 24 with the education, training, and experience they need to access well-paying jobs. Through coursework, personal skills development, and work-based learning, participants who complete the program learn the technical and soft skills needed to either continue their education or secure skilled work.	<ul style="list-style-type: none"> • Over 19,500 young adult participants • Provided interns for over 250 businesses 	Year Up, "Our Results," accessed December 10, 2019, https://www.yearup.org/our-approach/results/?location=national-us/ .



ACKNOWLEDGMENTS

Support for this project was generously provided by JPMorgan Chase & Co. as part of a global initiative to build demand-driven workforce systems that help workers and employers compete and prosper.

ABOUT THE AUTHORS

Matt Horton is a director at the Milken Institute's Center for Regional Economics and California Center. In this capacity, he interacts with government officials, business leaders, and other key stakeholders in directing statewide programming and policy initiatives. Horton's programmatic work at the Institute is focused on identifying a variety of financial tools, public policies, and collaborative models that leaders can deploy to increase investments in education, community development, housing, employment, and other areas supporting human capital and place-based economic development. Previously, Horton worked for the Southern California Association of Governments, the nation's largest metropolitan planning organization. There, Horton served as the primary point of contact for external and government affairs, coordinating regional policy development with elected officials as well as subregional, state, and federal stakeholders in Los Angeles and Orange counties. In this role, he developed plans with leaders across Southern California to address growth, build resiliency, and improve quality of life.

Michael Bernick is a research fellow at the Milken Institute's Center for Regional Economics, focusing on job creation and workforce development projects. In addition, Bernick currently serves as counsel in the area of employment and labor law for the international law firm Duane Morris. He previously served for nearly five years as director of the California Employment Development Department (EDD), the 10,000-person state department of labor. As EDD director, he oversaw the administration of the state's employer tax collection system, unemployment insurance system, and disability insurance system. Bernick is a graduate of Harvard College, Oxford University (Balliol College), and the University of California, Berkeley School of Law.



Jennifer Lovett is currently a senior project manager with California Forward, a nonprofit organization that advocates for shared prosperity across all of the state's regions and for improved government performance and accountability. Lovett previously worked for the Milken Institute's Center for Regional Economics as a public policy associate. Before that, she worked at Los Angeles-based strategic advisory firm Star Insights, the *Los Angeles Business Journal*, and the World Trade Center of New Orleans. Lovett received a bachelor of arts degree in international studies from Louisiana State University and a master of public policy degree from the University of Southern California.

Misael Galdamez is a senior policy analyst at the Milken Institute's Center for Regional Economics. He focuses on regional economic issues—specifically, the role of innovation, workforce, and housing policy in supporting growth and opportunity. Galdamez recently completed a master's degree in city planning at MIT's Department of Urban Studies and Planning, where his work centered on inclusive and equitable economic development. His thesis research developed an adapted methodology for living wage estimations in Mexico City. Prior to graduate school, Galdamez was a division and projects coordinator at the International Monetary Fund, where he worked on a number of research projects related to remittances and migration in and from Latin America.

