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Labor Market Analysis

Computer Programming



Prepared by Central Valley/Mother Lode Center of Excellence



POWERED BY



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COVID-19 Statement: This report includes employment projection data by Lightcast. Lightcast’s projections are modeled on recorded (historical) employment figures and incorporate several underlying assumptions, including the assumption that the economy during the projection period will be at approximately full employment or potential output. To the extent that a recession or labor shock, such as the economic effects of COVID-19, can cause long-term structural change, they may impact the projections. At this time, it is not possible to quantify the impact of COVID-19 on projections of industry and occupational employment. Other measures such as unemployment rates and monthly industry employment estimates will reflect the most recent information on employment and jobs in the state and, in combination with input from local employers, may help validate current and future employment needs as depicted here.

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Summary

The Central Valley/Mother Lode Center of Excellence developed this report for Columbia College to determine whether there is demand in the local labor market that is not being met by the supply from community college programs. This report summarizes labor market demand, wages, skills, and postsecondary supply for *Computer Programming*, which includes:

- Computer Network Support Specialists (SOC 15-1231)
- Computer User Support Specialists (SOC 15-1232)
- Computer Programmers (SOC 15-1251)
- Web Developers (SOC 15-1254)

Key Findings

- **Occupational Demand** — *Computer Programming Occupations* have a labor market demand of 162 annual job openings in the North Central Valley/Northern Mother Lode (NCV/NML) subregion. Between 2021 and 2026, computer user support specialists are projected to have the most demand with 99 annual job openings and are projected to increase by 13 percent.
- **Wages** — Average entry-level earnings of \$25.41/hour for *Computer Programming Occupations* are higher than the living wage in the NCV/NML subregion, which is \$12.65/hour for a single adult.¹ Computer programmers earn the highest entry-level wage, \$29.94/hour.
- **Employers and Occupational Titles** — Employers in the NCV/NML subregion include T-Mobile US, Robert Half, and Wireless Vision. The most common occupational title in job postings in the subregion is computer user support specialists. The most common job title is mobile experts.
- **Skills and Certifications** — The top baseline skill is communication, the top specialized skill is help desk support, and the top software skill is Apple iOS. The most in-demand certification is a CompTIA A+.
- **Education** — Some college is typically required for computer user support specialists. An associate degree is typically required for computer network support specialists. A bachelor's degree is typically required for computer programmers and web developers.
- **Supply and Demand Analysis** — Based on 162 annual openings (i.e., demand) and eight postsecondary degrees awarded (i.e., supply), an analysis of supply and demand suggests there is an undersupply of 154 workers in the NCV/NML subregion. In the CVML region, 17 awards were conferred suggesting an undersupply of 468 workers.

Recommendation

Based on a comparison of demand and supply, there is an undersupply of trained workers in the NCV/NML subregion and the CVML region. The Center of Excellence recommends that Columbia College work with the regional directors, the college's advisory board, and local industry in the expansion of programs to address the shortage of Computer Programming workers.

¹ The term "living wage" in Center of Excellence reports is calculated by averaging the self-sufficiency wages from the Insight Center's California Family Needs Calculator for each county in the subregion: <https://insightccd.org/tools-metrics/self-sufficiency-standard-tool-for-california/>.

Introduction

The Central Valley/Mother Lode Center of Excellence developed this report to provide Columbia College with labor market information for *Computer Programming*. The geographical focus for this report is the North Central Valley/Northern Mother Lode (NCV/NML) subregion, but regional demand and supply data has been included for broader applicability and use. Analysis of the program and occupational data related to *Computer Programming* is included in the report. The Standard Occupational Classification (SOC) System code and occupational title used in this report from the Bureau of Labor Statistics and O*NET OnLine is shown below.

Computer Network Support Specialists (SOC 15-1231)

- **Job Description:** Analyze, test, troubleshoot, and evaluate existing network systems, such as local area networks (LAN), wide area networks (WAN), cloud networks, servers, and other data communications networks. Perform network maintenance to ensure networks operate correctly with minimal interruption.
- **Knowledge:** Computers and Electronics, Telecommunications, Customer and Personal Service, Engineering and Technology
- **Skills:** Critical Thinking, Active Listening, Judgment and Decision Making, Reading Comprehension, Active Learning

Computer User Support Specialists (SOC 15-1232)

- **Job Description:** Provide technical assistance to computer users. Answer questions or resolve computer problems for clients in person, via telephone, or electronically. May provide assistance concerning the use of computer hardware and software, including printing, installation, word processing, electronic mail, and operating systems.
- **Knowledge:** Computers and Electronics, Customer and Personal Service, English Language, Telecommunications, Engineering and Technology
- **Skills:** Active Listening, Reading Comprehension, Speaking Complex Problem Solving, Critical Thinking

Computer Programmers (SOC 15-1251)

- **Job Description:** Create, modify, and test the code and scripts that allow computer applications to run. Work from specifications drawn up by software and web developers or other individuals. May develop and write computer programs to store, locate, and retrieve specific documents, data, and information.
- **Knowledge:** Computers and Electronics, Mathematics, Engineering and Technology, English Language, Customer and Personal Service
- **Skills:** Programming, Active Listening, Complex Problem Solving, Critical Thinking, Quality Control Analysis

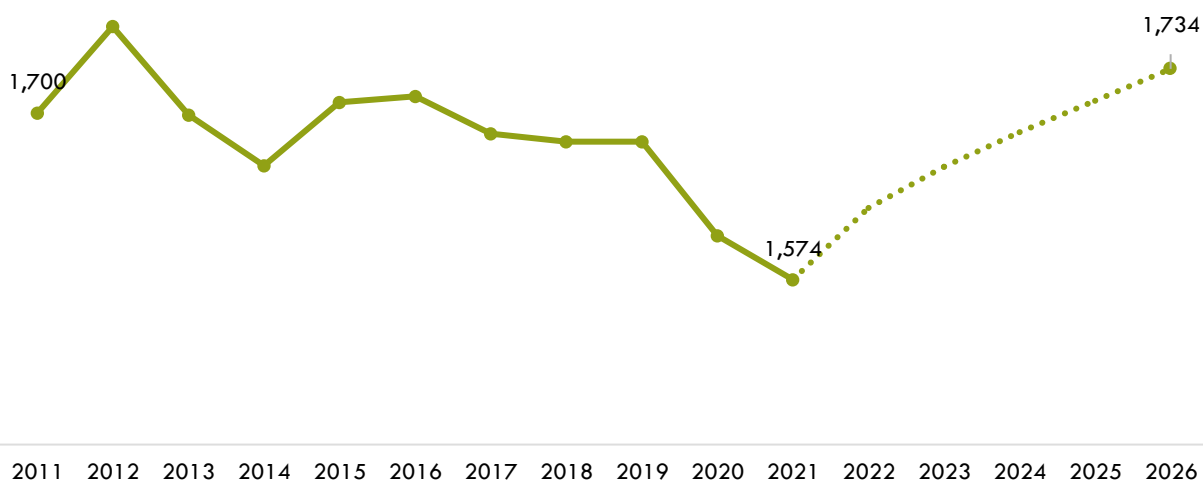
Web Developers (SOC 15-1254)

- **Job Description:** Develop and implement websites, web applications, application databases, and interactive web interfaces. Evaluate code to ensure that it is properly structured, meets industry standards, and is compatible with browsers and devices. Optimize website performance, scalability, and server-side code and processes. May develop website infrastructure and integrate websites with other computer applications.
- **Knowledge:** Computers and Electronics, English Language, Mathematics, Communications and Media
- **Skills:** Programming, Critical Thinking, Complex Problem Solving, Operations Analysis, Reading Comprehension

Employment

Exhibit 1a shows trends for *Computer Programming Occupations* in the NCV/NML subregion. Between 2021 to 2026, the number of jobs for *Computer Programming Occupations* is projected to increase by 160 job, or 10 percent.

Exhibit 1a. Occupational projections for *Computer Programming Occupations* in the NCV/NML subregion



In 2021, *Computer Programming Occupations* in the NCV/NML subregion employed 1,574 workers (Exhibit 1b). Computer user support specialists are projected to grow by 13% over the next five years and have projected annual openings of 99.

Exhibit 1b. Occupational projections for *Computer Programming Occupations* in the NCV/NML subregion

Occupation	2021 Jobs	2026 Jobs	5-Year Change	5-Year % Change	Annual Openings
Computer User Support Specialists	915	1,034	119	13%	99
Computer Network Support Specialists	352	380	28	8%	35
Computer Programmers	222	216	(6)	(3%)	17
Web Developers	85	104	19	22%	11
TOTAL	1,574	1,734	160	10%	162

Wages

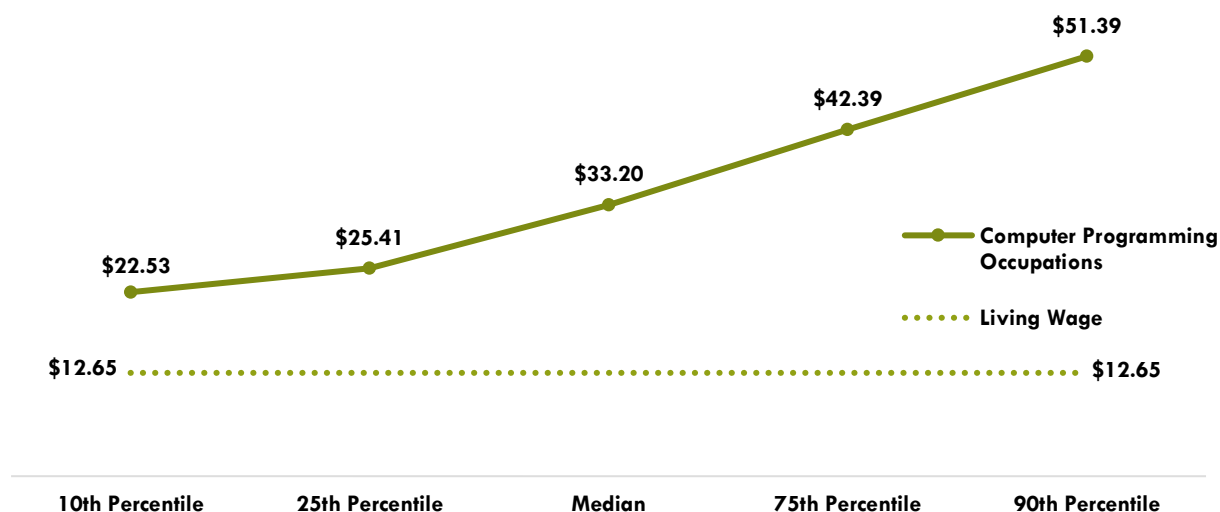
The average living wage for a single adult in the NCV/NML subregion is \$12.65/hour.² Exhibit 2a shows the hourly wages related to *Computer Programming Occupations*. Computer programmers earn the highest entry-level wage, which is \$25.41/hour in the subregion.³ Please note 10th and 25th percentiles are considered entry-level wages while 75th and 90th are considered experienced wages, either by gained by long-term employment, extra training, etc.

Exhibit 2a. Hourly wages for Computer Programming Occupations in the NCV/NML subregion

Occupation	Pct. 25 Hourly Earnings	Median Hourly Earnings	Pct. 75 Hourly Earnings
Computer Programmers	\$29.94	\$37.61	\$48.20
Web Developers	\$24.58	\$34.92	\$46.61
Computer Network Support Specialists	\$24.52	\$31.99	\$41.36
Computer User Support Specialists	\$22.59	\$28.28	\$33.39

Exhibit 2b shows the average hourly wages for *Computer Programming Occupations*; the average entry-level wage is more than the average entry-level living wage for the NCV/NML subregion.

Exhibit 2b. Computer Programming Occupations average hourly wages in the NCV/NML subregion



² The term "living wage" in Center of Excellence reports is calculated by averaging the self-sufficiency wages from the Insight Center's California Family Needs Calculator for each county in the subregion: <https://insightccd.org/tools-metrics/self-sufficiency-standard-tool-for-california/>.

³ Entry-level wages are derived from the 25th percentile.

Job Postings

There were 554 job postings for *Computer Programming Occupations* in the NCV/NML subregion from November 2022 to April 2023.⁴

Top Employers

The top employers with the most job postings are listed in Exhibit 3. The top employers in online job postings were T-Mobile US, Robert Half, and Wireless Vision.

Exhibit 3. Top employers of *Computer Programming Occupations* by number of job postings

Employer
T-Mobile US
Robert Half
Wireless Vision
Internal Revenue Service
Workforce
CTG
Best Buy
Yogurt Mill
Defense Logistics Agency
Apple

Top Occupational Titles

Exhibit 4 shows the O*NET OnLine occupational titles for *Computer Programming Occupations* in the NCV/NML subregion. Common job titles in postings include: Mobile Experts, Desktop Support Technicians, and IT Specialists.

Exhibit 4. Top occupational titles in job postings for *Computer Programming Occupations*

Occupational Title
Computer User Support Specialists
Computer Programmers
Web Developers
Computer Network Support Specialists

⁴ Other than occupation titles and job titles, the categories below can be counted one or multiple times per job posting, and across several areas in a single posting. For example, a skill can be counted in two different skill types, and an employer can indicate more than one education level.

Salaries

Exhibit 5 shows the “Market Salaries” for *Computer Programming*. These are calculated by Lightcast using a machine learning model built from millions of job postings every year. This accounts for adjustments based on location, industry, skills, experience, education, among other variables.

Exhibit 5. Market salaries for Computer Programming Occupations

Market Salary	Job Postings
\$49,000-\$54,999	60
\$43,000-\$48,999	49
\$55,000-\$60,999	36
\$67,000-\$72,999	36
\$85,000-\$140,000	33

Education

Of the 554 job postings, 450 listed a preferred or minimum educational requirement for the position being filled. Among those, 35% requested a bachelor’s degree, 35% requested a high school or GED, and 22% requested an associate degree (Exhibit 6).

Exhibit 6. Education levels requested in job postings for Computer Programming Occupations

Education Level	Job Postings	% of Job Postings
Bachelor’s degree	158	35%
High school or GED	156	35%
Associate degree	98	22%
Master’s degree	24	5%
Ph.D. or professional degree	14	3%

Baseline, Specialized, and Software Skills

Exhibit 7 depicts the top baseline, specialized, and software skills in job postings. The three most important baseline skills are communications, troubleshooting (problem solving), and customer service. The top three specialized skills are help desk support, operating systems, and technical support. The top software is Apple IOS.

Exhibit 7. In-demand baseline, specialized, and software skills for Computer Programming Occupations

Baseline Skills	Specialized Skills	Software Skills
Communications	Help Desk Support	Apple IOS
Troubleshooting (Problem Solving)	Operating Systems	Software Systems
Customer Service	Technical Support	JavaScript (Programming Language)
Operations	Computer Science	Java (Programming Language)
Management	Peripheral Devices	SQL (Programming Language)

Certifications

Of the 554 job postings, 234 contained certification data. Among those, 15% indicated a need for a CompTIA A+. The next top certification is a Microsoft Certified Professional (Exhibit 8).

Exhibit 8. Top Computer Programming Occupations certifications requested in job postings

Certifications	% of Job Postings
CompTIA A+	15%
Microsoft Certified Professional	8%
CompTIA Certification	8%
Hardware Certification	4%
Cisco Certified Network Associate	3%

Education, Work Experience, & Training

Some college is typically required for computer user support specialists. An associate degree is typically required for computer network support specialists. A bachelor's degree is typically required for computer programmers and web developers (Exhibit 9).

Exhibit 9. Education, work experience, training, and Current Population Survey results for Computer Programming Occupations⁵

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Computer User Support Specialists	Some college, no degree	None	None	39.2%
Computer Network Support Specialists	Associate degree	None	None	39.2%
Computer Programmers	Bachelor's degree	None	None	20.4%
Web Developers	Bachelor's degree	None	None	23.4%

⁵ "Labor Force Statistics from the Current Population Survey," Bureau of Labor Statistics, <https://www.bls.gov/cps/>.

Supply

An analysis of program data from the Integrated Postsecondary Education Data System (IPEDS) for the last three program years shows that, 17 awards was conferred in the NCV/NML subregion (Exhibit 10 and 11).

Exhibit 10. TOP and CIP codes for Computer Programming Occupations

TOP Titles	CIP Titles
070710 - Computer Programming	11.0201 - Computer Programming/Programmer, General
	11.0202 - Computer Programming, Specific Applications
	11.0203 - Computer Programming, Vendor/Product Certification
	11.0299 - Computer Programming, Other

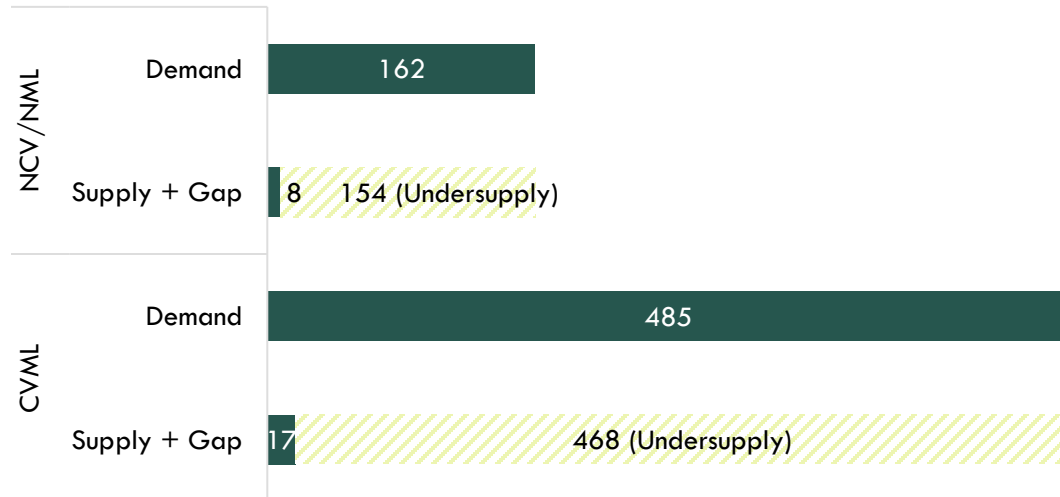
Exhibit 11. Postsecondary supply for Computer Programming Occupations

TOP/ CIP Code- Title	Row Labels	Associate Degree	Certificate 12 < 18 Semester Units	Certificate 16 < 30 Semester Units	Certificate 18 < 30 Semester Units	Certificate 30 < 60 Semester Units	Certificate 8 < 16 Semester Units	Total
070710 - Computer Programming	Columbia	2						2*
	Modesto Junior		4				1	5*
	Reedley College	2		6				8
	San Joaquin Delta					1		1*
	West Hills Lemoore				1			1
NCV/NML TOTAL		2	4	0	0	1	1	8
CVML TOTAL		4	4	6	1	1	1	17

*NCV/NML awards

There is an undersupply of 154 *Computer Programming* workers in the NCV/NML subregion and an undersupply of 468 workers in the region (Exhibit 10).

Exhibit 10. *Computer Programming Occupations* workforce demand (annual job openings), postsecondary awards (supply), and additional students needed to fill gap in the NCV/NML subregion and region



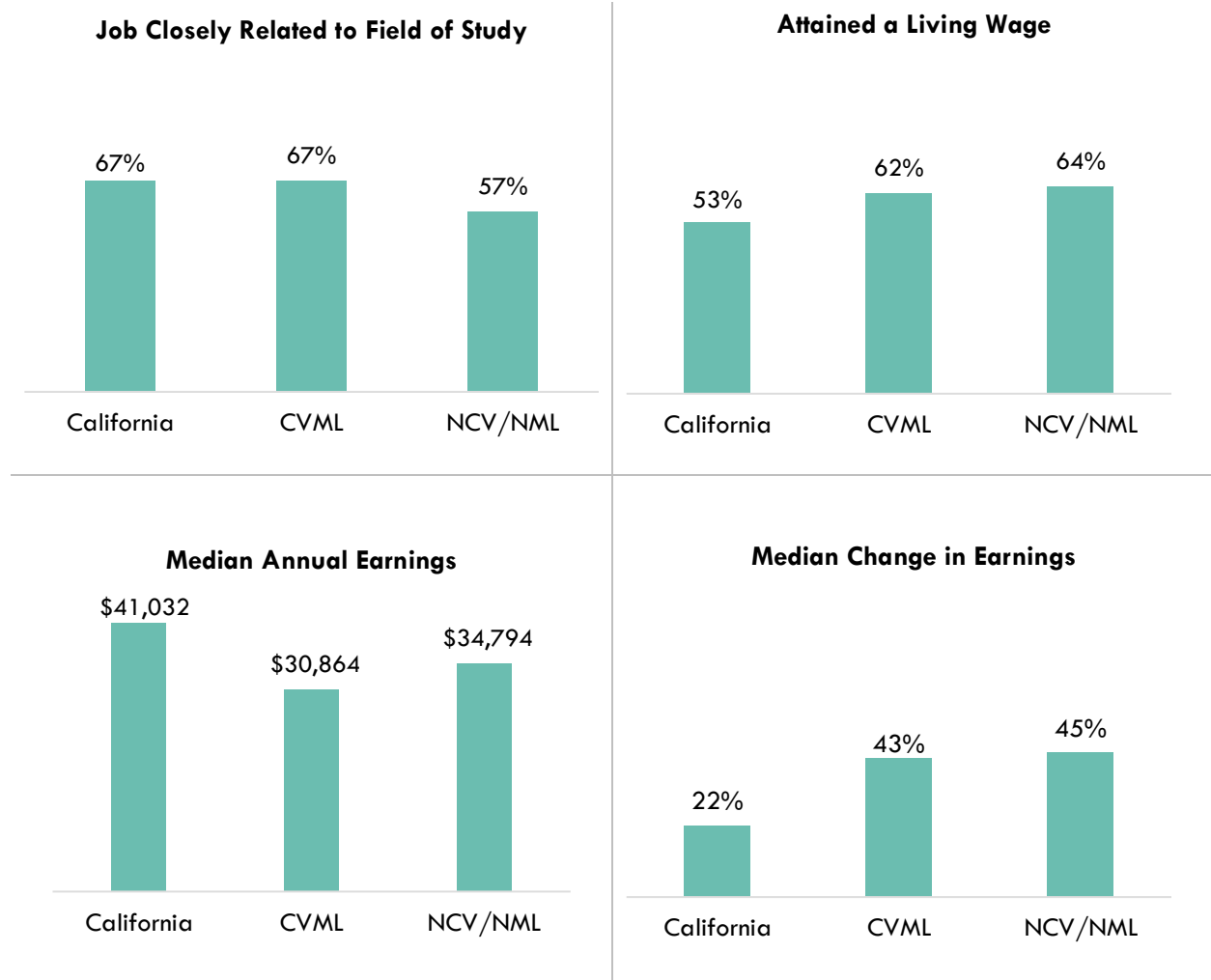
Student Outcomes

Exhibits 11a- 11b summarize outcomes from California Community College Chancellor’s LaunchBoard for TOP codes related to *Computer Programming*. Notably, 57% of students obtained a job closely related to their field of study in the subregion and 64% attained a living wage in the subregion.

Exhibit 11a. Metrics for TOP 070710 - Computer Programming

Metric	
Students Who Got a Degree or Certificate or Attained Apprenticeship Journey Status	10
Number of Students Who Transferred	128
*denotes data not available in table and charts	

Exhibit 11. Metrics for TOP 070710 - Computer Programming



Recommendation

This report suggests there is a shortage of 154 workers in the NCV/NML subregion and a shortage of 468 workers in the CVML region for *Computer Programming*. Based on these findings, it is recommended that Columbia College work with the regional directors, the college's advisory board, and local industry in the expansion of programs to address the shortage of *Computer Programming* workers in the region.

Appendix: Methodology & Data Sources

Data Sources

Labor market and educational supply data compiled in this report derive from a variety of sources. Data were drawn from external sources, including the Economic Modeling Specialists, Inc., the California Community Colleges Chancellor’s Office Management Information Systems Data Mart and the National Center for Educational Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS). Below is the summary of the data sources found in this study.

Data Type	Source
Labor Market Information/Population Estimates and Projections/Educational Attainment	Economic Modeling Specialists, Intl. (LIGHTCAST). LIGHTCAST occupational employment data are based on final LIGHTCAST industry data and final LIGHTCAST staffing patterns. Wage estimates are based on Occupational Employment Statistics (QCEW and Non-QCEW Employees classes of worker) and the American Community Survey (Self-Employed and Extended Proprietors). Occupational wage estimates also affected by county-level LIGHTCAST earnings by industry: economicmodeling.com .
Typical Education Level and On-the-job Training	Bureau of Labor Statistics (BLS) uses a system to assign categories for entry-level education and typical on-the-job training to each occupation for which BLS publishes projections data: https://www.bls.gov/emp/tables/educational-attainment.htm .
LaunchBoard	Chancellor’s LaunchBoard. https://www.calpassplus.org/LaunchBoard/SWP.aspx
Labor Force, Employment and Unemployment Estimates	California Employment Development Department, Labor Market Information Division: labormarketinfo.edd.ca.gov .
Job Posting and Skills Data	Burning Glass: burning-glass.com/ .
Additional Education Requirements/ Employer Preferences	The O*NET Job Zone database includes over 900 as well as information on skills, abilities, knowledge, work activities and interests associated with specific occupations: onetonline.org .

Key Terms and Concepts

Annual Job Openings: Annual openings are calculated by dividing the number of years in the projection period by total job openings.

Education Attainment Level: The highest education attainment level of workers age 25 years or older.

Employment Estimate: The total number of workers currently employed.

Employment Projections: Projections of employment are calculated by a proprietary Economic Modeling Specialists, Intl. (LIGHTCAST) formula that includes historical employment and economic indicators along with national, state and local trends.

LaunchBoard (Attained the Living Wage): Among SWP students who exited college and did not transfer to any postsecondary institution, the proportion who attained the district county living wage for a single adult measured immediately following academic year of exit

LaunchBoard (Median Annual Earnings): Among SWP students who exited the community college system and who did not transfer to any postsecondary institution, median earnings following the academic year of exit.

LaunchBoard (Median Change in Earnings): Among SWP students who exited and who did not transfer to any postsecondary institution, median change in earnings between the second quarter prior to the beginning of the academic year of entry and the second quarter after the end of the academic year of exit from the last college attended.

LaunchBoard (Job Closely Related to Field of Study): Among SWP students who responded to the CTE Outcomes Survey and did not transfer to any postsecondary institution, the proportion who reported that they are working in a job very closely or closely related to their field of study.

Living Wage: The cost of living in a specific community or region for one adult and no children. The cost increases with the addition of children.

Occupation: An occupation is a grouping of job titles that have a similar set of activities or tasks that employees perform.

Percent Change: Rate of growth or decline in the occupation for the projected period; this does not factor in replacement openings.

Replacements: Estimate of job openings resulting from workers retiring or otherwise permanently leaving an occupation. Workers entering an occupation often need training. These replacement needs, added to job openings due to growth, may be used to assess the minimum number of workers who will need to be trained for an occupation.

Total Job Openings (New + Replacements): Sum of projected growth (new jobs) and replacement needs. When an occupation is expected to lose jobs, or retain the current employment level, number of openings will equal replacements.

Typical Education Requirement: represents the typical education level most workers need to enter an occupation.

Typical On-The-Job Training: indicates the typical on-the-job training needed to attain competency in the skills needed in the occupation.