

October 2021

# Labor Market Analysis

## Computer Infrastructure and Support

POWERED BY

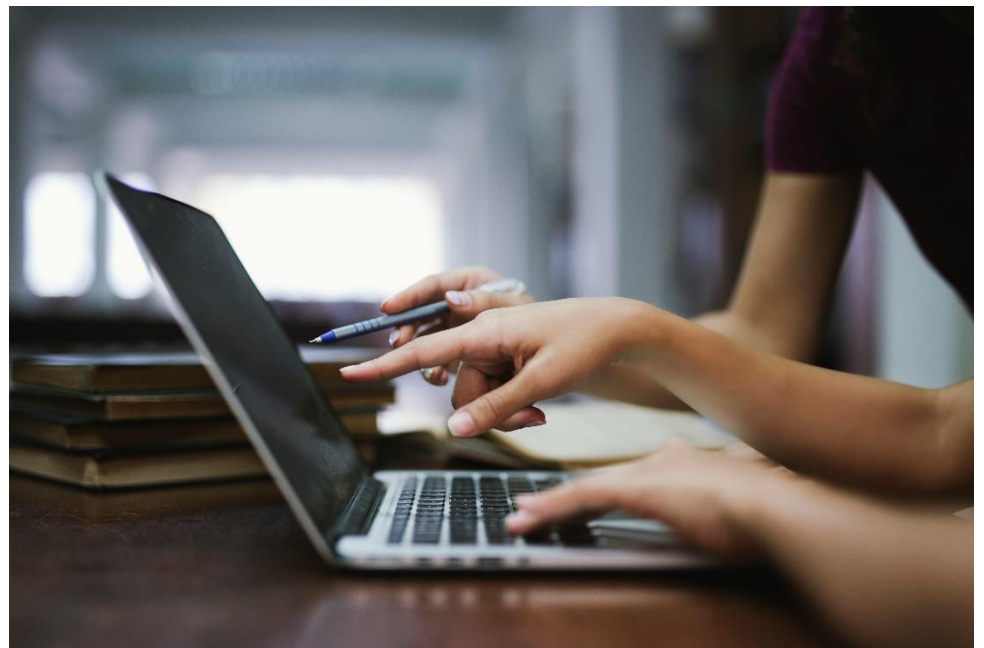


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Prepared by the Central Valley/Mother Lode Center of Excellence

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# Table of Contents

- Summary ..... 2
- Key Findings: ..... 2
- Introduction ..... 3
- Occupational Demand ..... 5
- Wages ..... 5
- Job Postings ..... 6
- Salaries..... 6
- Education ..... 7
- Baseline and Specialized Skills ..... 7
- Software Skills..... 8
- Certifications..... 8
- Education, Work Experience & Training ..... 8
- Supply ..... 9
- Student Outcomes ..... 11
- Conclusion ..... 12
- Recommendation ..... 12
- Appendix A: Methodology & Data Sources ..... 13

**COVID-19 Statement:** This report includes employment projection data by Emsi. Emsi’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.

*If for any reason this document is not accessible or if you have specific needs for readability, please contact us and we will do our utmost to accommodate you with a modified version. To make a request, contact Nora Seronello by phone at (209) 575-6894 or by email [seronellon@mjc.edu](mailto:seronellon@mjc.edu).*

# Summary

Please note the COVID-19 statement on page 2 when considering this report's findings.

This study conducted by the Central Valley/Mother Lode Center of Excellence examines labor market demand, wages, skills, and postsecondary supply for computer electronics. Six occupations related to computer infrastructure and support were identified for Modesto Junior College:

- 15-1231, Computer Network Support Specialists
- 15-1232, Computer User Support Specialists
- 15-1241, Computer Network Architects
- 15-1244, Network and Computer Systems Administrators

## Key Findings:

- **Occupational demand** — More than 1,800 workers were employed in jobs related to computer infrastructure and support in 2020 in the North Central Valley/Northern Mother Lode (NCV/NML) subregion. The largest occupation is computer user support specialists, with 1,016 workers in 2020, a projected growth rate of 8% over the next five years, and 93 annual openings.
- **Wages** — Computer network architects, earn the highest entry-level wage, \$34.81/hour in the subregion.
- **Employers** — Employers with the most job postings in the subregion are Best Buy, Anthem Blue Cross, and Utility Telecon Group.
- **Occupational titles** — The most common occupational title in job postings in the subregion is computer user support specialists. The most common job title is It support specialists.
- **Skills and certifications** — The top baseline skill is troubleshooting, the top specialized skill is technical support, and the top software skill is Microsoft Office. The most in-demand certification is a driver's license.
- **Education** — Some college, no degree is typically required for computer user support specialist. A bachelor's degree is typically for network and computer systems administrator and computer network architects. An associate degree is typically required for computer network support specialists.
- **Supply** — Analysis of postsecondary completions in the region shows that on average 178 awards were conferred in the Central Valley/Mother Lode region each year.

Based on a comparison of occupational demand and supply, there is an undersupply of 105 trained workers in the subregion and 309 workers in the region. The Center of Excellence recommends that Modesto Junior 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 infrastructure and support workers in the region.

# Introduction

The Central Valley/Mother Lode Center of Excellence was asked by Modesto Junior College to provide labor market information for computer infrastructure and support. 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. The average living wage for a single adult in the NCV/NML subregion is \$12.65/hour.<sup>1</sup> Analysis of the program and occupational data related to computer infrastructure and support resulted in the identification of applicable occupations. The Standard Occupational Classification (SOC) System codes and titles used in this report are:

- 15-1231, Computer Network Support Specialists
- 15-1232, Computer User Support Specialists
- 15-1241, Computer Network Architects
- 15-1244, Network and Computer Systems Administrators

The occupational titles, job descriptions, and knowledge and skills from the Bureau of Labor Statistics and O\*NET OnLine are shown below.

## **Computer Network Support Specialists**

**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:** Computer and Electronics, English Language, Customer and Personal Service, Engineering and Technology, Mathematics

**Skills:** Critical Thinking, Active Listening, Judgement and Decision Making, Reading Comprehension, Active Learning

## **Computer User Support Specialists**

**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:** Computer and Electronics, Customer and Personal Service, English Language, Telecommunications, Engineering and Technology

**Skills:** Active Listening, Reading Comprehension, Speaking, Complex Problem Solving, Critical Thinking

## **Computer Network Architects**

**Job Description:** Design and implement computer and information networks, such as local area networks (LAN), wide area networks (WAN), intranets, extranets, and other data communications networks. Perform network modeling, analysis, and planning, including analysis of capacity needs for network infrastructures. May also design network and computer security measures. May research and recommend network and data communications hardware and software.

**Knowledge:** Computer and Electronics, Telecommunications, Engineering and Technology, English Language, Design

**Skills:** Critical Thinking, Active Listening, Complex Problem Solving, Reading Comprehension, Judgment and Decision Making

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<sup>1</sup> 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/>.

### **Network and Computer Systems Administrators**

**Job Description:** Install, configure, and maintain an organization's local area network (LAN), wide area network (WAN), data communications network, operating systems, and physical and virtual servers. Perform system monitoring and verify the integrity and availability of hardware, network, and server resources and systems. Review system and application logs and verify completion of scheduled jobs, including system backups. Analyze network and server resource consumption and control user access. Install and upgrade software and maintain software licenses. May assist in network modeling, analysis, planning, and coordination between network and data communications hardware and software.

**Knowledge:** Computer and Electronics, English Language, Customer and Personal Service, Engineering and Technology, Mathematics

**Skills:** Critical Thinking, Judgement and Decision Making, Reading Comprehension, Systems Analysis, Active Listening

# Occupational Demand

The North Central Valley/Northern Mother Lode subregion employed 1,843 workers in computer infrastructure and support occupations in 2020 (Exhibit 1). The largest occupation is, computer user support specialists, with 1,016 workers in 2020. This occupation is projected to grow by 8% over the next five years and has the greatest number of projected annual openings, 93.

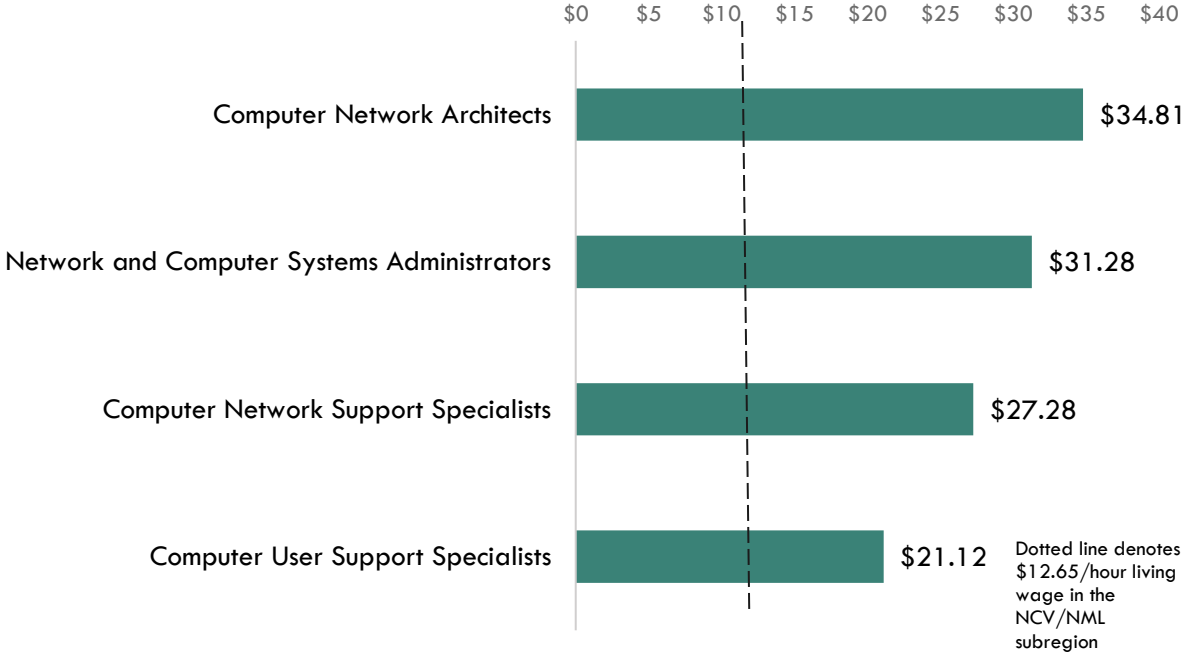
**Exhibit 1. Computer infrastructure and support employment and occupational projections in the NCV/NML subregion**

Occupation	2020 Jobs	2025 Jobs	5-Year Change	5-Year % Change	Annual Openings
Computer User Support Specialists	1,016	1,099	84	8%	93
Network and Computer Systems Administrators	419	459	39	9%	36
Computer Network Support Specialists	272	292	19	7%	25
Computer Network Architects	136	140	4	3%	10
<b>TOTAL</b>	<b>1,843</b>	<b>1,990</b>	<b>147</b>	<b>8%</b>	<b>164</b>

# Wages

Exhibit 2 shows the entry-level hourly wages of the computer infrastructure and support occupations. Computer network architects, earn the highest entry-level wage, \$34.81/hour in the subregion. Entry-level wages are derived from the 25<sup>th</sup> percentile.

**Exhibit 2. Computer infrastructure and support entry-level wages in the NCV/NML subregion**



# Job Postings

There were 629 job postings for the four occupations in the NCV/NML subregion from April 2021 to September 2021.<sup>2</sup> The employers with the most job postings are listed in Exhibit 3.

**Exhibit 3. Top employers of computer infrastructure and support workers by number of job postings**

Employer	Job Postings	% Job Postings
Best Buy	29	6%
Anthem Blue Cross	15	3%
Utility Telecom Group	7	1%
Workforce Incorporated	7	1%
Golden Valley Health Centers	6	1%
Pacific Coast Producers	6	1%
University Pacific	6	1%
Amazon	5	1%
Danaher Corporation	5	1%
Ej Gallo	5	1%

Exhibit 4 shows how job postings for the targeted occupations in the NCV/NML subregion are distributed across 5 O\*NET OnLine occupations. The occupational title computer user support specialists is listed in 433 job postings. Note how this occupational title dominates the job posting results. Common job titles in postings include It support specialist in 17 job postings, It technician in 14 job postings, and help desk technician in 10 job postings.

**Exhibit 4. Top occupational titles in job postings for computer infrastructure and support occupations**

Occupational Title	Job Postings	% of Job Postings
Computer User Support Specialists	433	69%
Network and Computer Systems Administrators	81	13%
Computer Network Architects	67	11%
Computer Network Support Specialists	34	5%
Telecommunications Engineering Specialists	14	2%
Computer User Support Specialists	433	69%

## Salaries

Exhibit 5 shows the “Market Salaries” for computer infrastructure and support occupations that are calculated by Burning Glass which uses a machine learning model built off of millions of job postings every year, and accounts for adjustments based on locations, industry, skills, experience, education requirements, among other variables.

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<sup>2</sup> 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.

**Exhibit 5. Salaries for computer infrastructure and support occupations**

Market Salary Percentile	Salary Amount
10th Percentile	\$31,526
25th Percentile	\$36,532
50th Percentile	\$45,031
75th Percentile	\$59,829
90th Percentile	\$87,301

**Education**

Of the 629 job postings, 359 listed an education level preferred for the positions being filled. Of those, 57% requested a bachelor’s degree, 50% requested a high school or vocational training, and 19% requested an associate degree (Exhibit 6). A job posting can indicate more than one education level. Hence, the percentages shown in the chart below may total more than 100%.

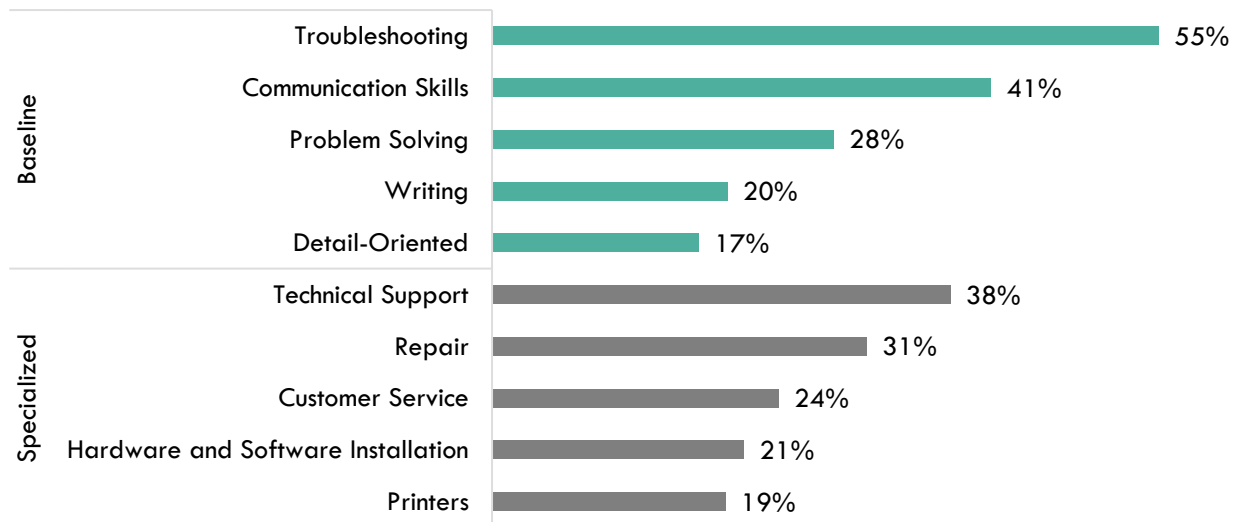
**Exhibit 6. Education levels requested in job postings for computer infrastructure and support occupations**

Education Level	Job Postings	% of Job Postings
Bachelor's degree	203	57%
High school or vocational training	178	50%
Associate's degree	68	19%
Master's degree	18	5%
Doctoral degree	11	3%

**Baseline and Specialized Skills**

Exhibit 7 depicts the top baseline and specialized skills for the targeted occupations. The three most important baseline skills are troubleshooting, 55% of job postings, communication, 41%, and problem solving, 28%. The top three specialized skills are technical support, 38% of job postings, repair, 31%, and customer service, 24%.

**Exhibit 7. In-demand computer infrastructure and support baseline and specialized skills**

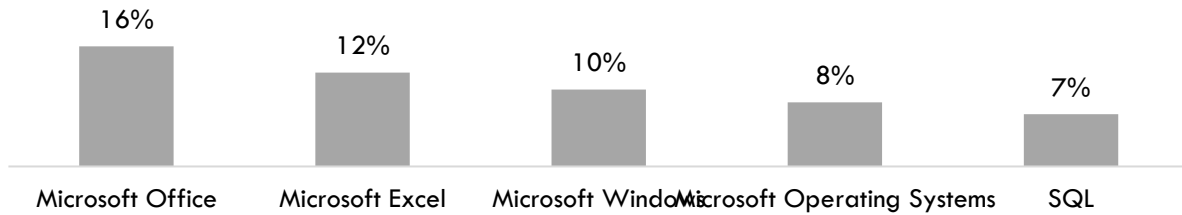




### Software Skills

Analysis also included the software skills most in demand by employers. Microsoft Office and Excel were the top two software skills identified in job postings (Exhibit 8).

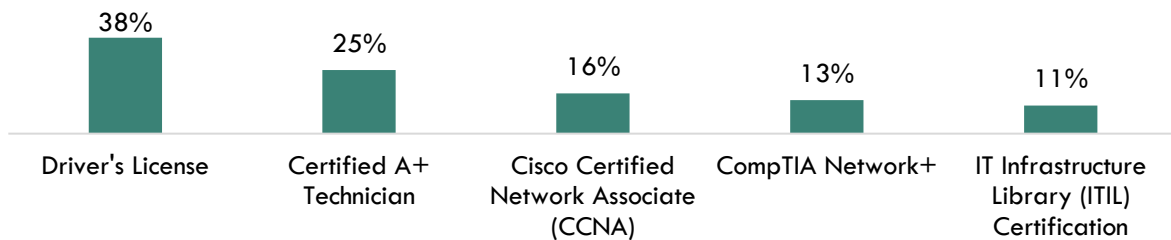
**Exhibit 8. In-demand computer infrastructure and support software skills**



### Certifications

Of the 629 job postings, 228 contained certification data. Among those, 38% indicated a need for a driver's license. The next top certifications are A+ technician and Cisco certified Network associate (Exhibit 9). (Due to the low number of job postings with certifications listed, the chart below may not be representative of the full sample.)

**Exhibit 9. Top computer infrastructure and support requested in job postings**



## Education, Work Experience & Training

Some college, no degree is typically required for computer user support specialist. A bachelor's degree is typically for network and computer systems administrator and computer network architects. An associate degree is typically required for computer network support specialists. (Exhibit 10)

**Exhibit 10. Education, work experience, training, and Current Population Survey results for computer infrastructure and support occupations<sup>3</sup>**

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%
Network and Computer Systems Administrators	Bachelor's degree	None	None	37.4%
Computer Network Support Specialists	Associate's degree	None	None	39.2%
Computer Network Architects	Bachelor's degree	5 years or more	None	37.7%

<sup>3</sup> "Labor Force Statistics from the Current Population Survey," Bureau of Labor Statistics, <https://www.bls.gov/cps/>.

# Supply

Analysis of program data from the California Community Colleges Chancellor’s Office Data Mart included the TOP and CIP codes and titles: 070800 - Computer Infrastructure and Support, 070810 - Computer Networking, 070820 - Computer Support, 11.0901 - Computer Systems Networking and Telecommunications, 11.1003 - Computer and Information Systems Security/Information Assurance, and 11.1006 - Computer infrastructure and support. Analysis of the last three years of data shows that, on average, 178 awards were conferred in the Central Valley/Mother Lode region each year (Exhibit 11).

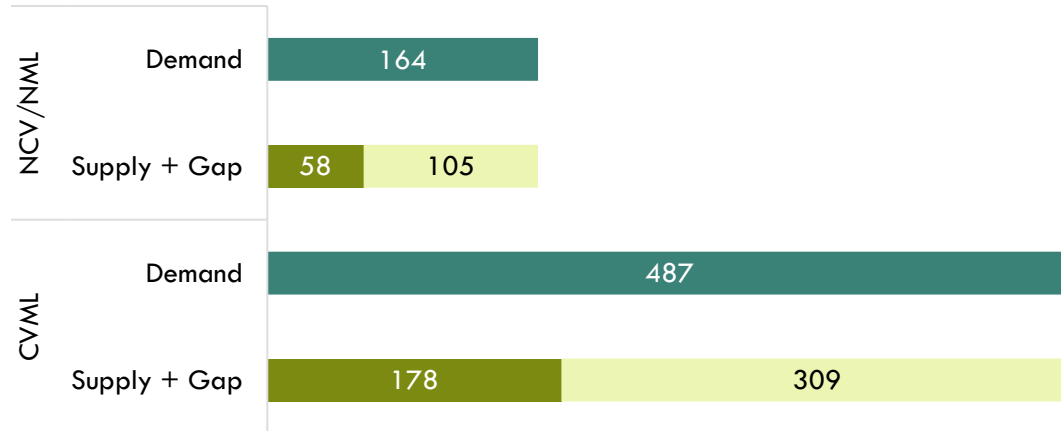
**Exhibit 11. Postsecondary supply for computer infrastructure and support occupations in the region**

Row Labels	Row Labels	Associate Degree	Award 1 < 2 Academic Years	Certificate 12 < 18 Semester Units	Certificate 16 < 30 Semester Units	Certificate 18 < 30 Semester Units	Certificate 30 < 60 Semester Units	Certificate 6 < 18 Semester Units	Certificate 8 < 16 Semester Units	Subtotal
070800 - Computer Infrastructure and Support	Bakersfield						5			5
	Fresno City			3	1					4
	Sequoias							2		2
070810 - Computer Networking	Cerro Coso	9					10			18
	Clovis	2				1				3
	Fresno City	22					22			45
	Modesto			7					1	8
	Reedley College	4			9	7				20
	San Joaquin Delta	15				18	3			37
	Sequoias	1						5		6
	West Hills Lemoore					0	1			1
070820 - Computer Support	Clovis	0			0					1
	Reedley College	4					4			8
11.0901 - Computer Systems Networking and Telecommunications	Institute of Technology		13							13
11.1003 - Computer and Information Systems Security/Information Assurance	University of the Pacific									0
11.1006 - Computer Support Specialist	San Joaquin Valley College-Visalia	7								7

Row Labels	Row Labels	Associate Degree	Award 1 < 2 Academic Years	Certificate 12 < 18 Semester Units	Certificate 16 < 30 Semester Units	Certificate 18 < 30 Semester Units	Certificate 30 < 60 Semester Units	Certificate 6 < 18 Semester Units	Certificate 8 < 16 Semester Units	Subtotal
	<b>Santa Barbara Business College-Bakersfield</b>	0								0
<b>TOTAL</b>		<b>65</b>	<b>13</b>	<b>10</b>	<b>10</b>	<b>30</b>	<b>40</b>	<b>8</b>	<b>1</b>	<b>178</b>

There is an undersupply of 105 computer infrastructure and support workers in the NCV/NML subregion and 309 workers in the region (Exhibit 12).

**Exhibit 12. Computer infrastructure and support workforce annual demand and supply in the NCV/NML subregion and CVML region**



## Student Outcomes

Exhibit 13 summarizes employment and wage outcomes from the California Community College Chancellor's Cal-PASS Plus LaunchBoard for the TOP codes related to computer infrastructure and support. Of note, there were 383 computer infrastructure and support students who received a degree or certificate or attained apprenticeship journey status; 306 students transferred; 71% of students obtained a job closely related to their field of study; 14% reported a median change in earnings; and 62% attained a living wage.

**Exhibit 13. Regional metrics for the TOP codes related to computer electronics**

Metric	Computer Infrastructure and Support	Computer Networking	Computer Support
	070800	070810	070820
Students Who Got a Degree or Certificate or Attained Apprenticeship Journey Status	383	623	450
Number of Students Who Transferred	306	387	56
Job Closely Related to Field of Study	71%	68%	70%
Median Change in Earnings	14%	16%	13%
Attained a Living Wage	62%	65%	55%
* denotes data not available.			

## Conclusion

The entry-level wages of all four of the occupations exceed the NCV/NML subregion's average living wage. There were 629 job postings in the past six months for occupations related to computer infrastructure and support in the subregion. Analysis of skills and certification requirements in job postings indicates:

- The top baseline skill is trouble shooting, and the top specialized skill is technical support.
- The top software skill is Microsoft Office.
- The top certification is a driver's license.

There is an undersupply of trained workers, a shortage of 105 in the NCV/NML subregion and 309 in the region.

## Recommendation

Based on these findings, it is recommended that Modesto Junior 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 infrastructure and support workers in the region.

# Appendix A: 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. (EMSI). EMSI occupational employment data are based on final EMSI industry data and final EMSI 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 EMSI earnings by industry: <a href="http://economicmodeling.com">economicmodeling.com</a> .
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: <a href="https://www.bls.gov/emp/tables/educational-attainment.htm">https://www.bls.gov/emp/tables/educational-attainment.htm</a> .
Labor Force, Employment and Unemployment Estimates	California Employment Development Department, Labor Market Information Division: <a href="http://labormarketinfo.edd.ca.gov">labormarketinfo.edd.ca.gov</a> .
Job Posting and Skills Data	Burning Glass: <a href="http://burning-glass.com/">burning-glass.com/</a> .
Additional Education Requirements/ Employer Preferences	The O*NET Job Zone database includes over 900 occupations as well as information on skills, abilities, knowledge, work activities and interests associated with specific occupations: <a href="http://onetonline.org">onetonline.org</a> .

## 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. (EMSI) formula that includes historical employment and economic indicators along with national, state and local trends.

**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.