



CENTERS OF EXCELLENCE
FOR LABOR MARKET RESEARCH

LABOR MARKET ASSESSMENT GOOGLE IT SUPPORT PROFESSIONAL CERTIFICATE



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COVID-19 Disclaimer

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.

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EXECUTIVE SUMMARY

In recent months there has been rising interest across the state in pairing community college coursework with the Google IT Support Professional Certificate offered online through Coursera. As a result, the Far North Center of Excellence initiated a study to determine how the certificate aligns with existing occupations, the employment outlook for those occupations, how the certificate's skills align with skills associated with its aligned occupations, and opportunities in the Far North region to expand or develop new community college coursework that addresses in-demand occupations related to the certificate. The study examined workforce demand in the North/Far North region and macroregions across the state to determine if the need for these occupations varies by geography.

The Google IT Support Professional Certificate incorporates training in troubleshooting, customer service, networking, operating systems, system administration, and security. Based on the COE's analysis, the certificate aligns with two entry-level occupations: computer user support specialists and computer network specialists. The certificate also aligns with one supervisory/administration occupation: network systems administrators.

Key findings from the study include:

Educational attainment—About 40% of workers in the three occupations have completed some college, no degree, or an associate degree. As a result, these occupations are well suited for training through community college programs. A higher percentage of network systems administrators have a bachelor's degree, 40%.

Wages—All three occupations pay substantially more than the region's living wage for one adult. In the Far North subregion, computer user support specialists earn a median wage of \$21.96/hour; computer network support specialists earn \$27.70/hour; and network and computer systems administrators earn \$37.49/hour. Wages tend to be higher by \$4-\$7/hour in the North subregion, which encompasses the greater Sacramento area where the cost of living is greater. Across the state, median wages for computer user support specialists, an occupation closely aligned to the certificate, ranges from \$20/hour to \$30/hour.

Employment outlook—In the North/Far North region, more than 8,000 workers were employed in the three occupations. The most annual openings, 467, are projected for computer user support specialists, which is projected to undergo 8% growth through 2024. Across California, the regions with the greatest number of annual openings include the Bay Area, San Diego/Imperial, and Los Angeles/Orange County.

Top industries—The three occupations are most concentrated in the computer systems design and related services industry. Macroregion analysis shows that in more rural areas, these occupations tend to be concentrated in the education and government industries. This trend is particularly apparent in the North/Far North region where the top industries are: education and hospitals (state government), education and hospitals (local government), state government, excluding education and hospitals; and local government, excluding education and hospitals.

Recommendations:

- Based on the COE's analysis, it does not appear that the certificate perfectly aligns with any one occupation, although there is some overlap between the skills it is designed to train for and the skills required of the two support occupations. The certificate could be used to augment a student's resume when that student completes training to enter one of the occupations identified by the study.
- There are several program opportunities which community colleges in the Far North subregion may choose to pursue, particularly computer infrastructure and support, and computer networking. Far North colleges should consider offering a computer support program.

INTRODUCTION

Over the past year, the nonprofit Jobs for the Future (JFF) has been working to scale up a Google IT Support Professional Certificate offered through Coursera that prepares students for entry-level information technology (IT) jobs. Facing a recurring shortage of qualified candidates in this area, Google initially developed the certificate and partnered with JFF to expand the certificate's impact by building out training programs and career pathways. The certificate trains students to enter IT support roles, jobs which are in demand and expected to grow over the next 10 years. These jobs exist at nearly every company with employees who use computers.

Typically, the certificate can be completed online in eight months (5 hours/week). Students are not required to have any prior experience or knowledge. IT support positions generally do not require a college degree; however, prior experience is needed.

So far, community colleges in seven states, including California, have signed on to offer the certificate program to their students. Some colleges are providing credit for prior learning for learners who complete the certificate; others are offering credit through one or more courses. Thus far, the implementation project by JFF has found that student completion rates are higher when the certificate is bundled in a for-credit program, and when both academic and job support services are offered.

In July, Google announced it would launch three more IT-related certificates along with scholarships and grant money to expand training.¹ According to a CNBC article, the low-cost certificates are seen as a way to combat historic inequality in the tech field, and Google's VP of Grow with Google said the certificates serve as an on-ramp for underrepresented and "nontraditional applicants." According to numbers provided by Google for the article, 58% of those who take its IT certificate identify as Black, Latino, female or as a veteran and 45% of enrollees make less than \$30,000 per year.

Several reports by the California Community Colleges Chancellor's Office and the Centers of Excellence for Labor Market Research have identified IT and Information Communication Technology (ICT) as opportunity areas for job placement and career progression. Most recently, a "Business Information Worker, Digital Media, and Information and Communication Environmental Scan" by SynED found that employers seek to hire IT employees with broad technical skills, and that after five years, a certificate holder typically earns 2% more than a degree holder. However, the study found that although 80% of students complete a program, only 10% obtain a certificate. The study also found that ICT is not in high demand locally, although opportunities exist in Butte and Shasta counties; however, the report encouraged graduates to look for remote work opportunities.

In the Far North region, recognition that tech program offerings have been somewhat limited has prompted several colleges to express interest in offering the certificate, which facilitates skills development in troubleshooting, customer service, networking, operating systems, system administration, and security. Butte College is piloting the certificate by integrating it into an existing course and recruiting displaced workers—those who are age 18 and older, low income, and are either unemployed or underemployed—to enroll in the program. Given the rising interest in the certificate, the Far North Center of Excellence was asked to conduct an analysis of labor market demand, skills, and postsecondary supply for middle-skill occupations (those requiring more than a high school diploma but less than a bachelor's degree) that correspond to the certificate in the Far North region and statewide. One of the first steps involved identifying occupations that align with the Google IT Support Professional Certificate. As a result, this report focuses on three primary occupations:

- Computer user support specialists
- Computer network support specialists
- Network and computer systems administrators

¹ Abigail Hess, "Google announces 100,000 scholarships for online certificates in data analytics, project management and UX," CNBC Make It, July 13, 2020, accessed August 4, 2020, <https://www.cnbc.com/2020/07/13/google-announces-certificates-in-data-project-management-and-ux.html>.

Rise of remote IT work

The technological revolution has resulted in the computerization of the workplace. Today, IT support workers are needed by nearly every company in nearly every type of industry to facilitate and maintain digital interconnectivity at every level in the workplace. In addition, in recent months, there has been speculation that some IT jobs may be well positioned to better withstand the economic upheaval resulting from the Covid-19 pandemic. For example, a study in June by Chmura Economics & Analytics, a labor market analysis company, found that Computer Systems Design and Related Services, and Data Processing, Hosting, and Related Services were among the top 15 industries with the highest concentration of remote employment.²

In April, U.S. News & World Reports named computer systems administrators among the top 15 best jobs for remote work, especially with the rise of cloud computing services.³ And in May, the technology website CIO Dive reported that tech jobs have been isolated from the economic fallout from the pandemic, stating:

“Across a national economic downturn and lagging employment, the technology sector is withstanding the worst of the fallout from the coronavirus pandemic. While the national unemployment rate rose to 14.7%, the IT unemployment was well under the national average at 4.3%.”⁴

The article also reports that computer user support specialists are among the most in demand roles.

Another article published in June by CIO Dive reports that businesses plan to continue investing in IT:

“As businesses prioritize sustaining operations, tech budgets are set to increase at 56% of surveyed companies. More than half (55%) of leaders say they’re prioritizing tech spending on remote technology resources. Another 40% say their budget will focus on a mix of remote and in-office resources. The top three areas for increased IT spending are cloud-based software, remote IT support and collaboration software, according to surveyed executives.”⁵

Even before the pandemic, remote work was on the rise. According to Global Workforce Analytics, regular work-at-home has grown 173% since 2005, 11% faster than the rest of the workforce (which grew 15%) and nearly 47 times faster than the self-employed population (which grew by 4%) based on an analysis of the 2005-2018 American Community Survey.⁶ A 2019 study by FlexJobs finds that 3.4% of the total U.S. workforce are remote workers, up from 2.9% in 2015.⁷ The same study found that remote work increased 44% over the last five years. In its annual Top 100 Companies with Remote Jobs, released in January, FlexJobs found that healthcare and computer/IT were the most promising career fields for “remote-friendly” jobs.⁸ In January, the technology website Dice posted the 19 most in-demand occupations in Silicon Valley, which included computer user support specialists, and network and computer systems administrators, two of the three occupations that are the focus of this report.⁹

² Greg Chmura, “Which jobs can be done remotely? A JobsEQ analysis of remote occupations, Chmura Economics and Analytics, June 24, 2020, accessed July 15, 2020, http://chmuraecon.com/blog/2020/june/which-jobs-can-be-done-remotely-a-jobseq-analysis-of-remote-occupations/?utm_source=Chmura+Mail+List+%26+COVID-19+Updates&utm_campaign=1b1ed351d7-EMAIL_CAMPAIGN_2019_12_02_09_57_COPY_01&utm_medium=email&utm_term=0_f333f036d3-1b1ed351d7-128510049.

³ Maryalene, LaPonsie, “15 Best Jobs for Remote Work,” U.S. News and World Reports, April 13, 2020, accessed June 29, 2020, <https://money.usnews.com/careers/best-jobs/slideshows/best-remote-working-jobs?slide=15>.

⁴ Naomi Eide, “Coronavirus fallout hits tech employment, job losses mount,” CIO Dive, May 13, 2020, <https://www.ciodive.com/news/coronavirus-fallout-hits-tech-employment-job-losses-mount/577840/>.

⁵ Roberto Torres, “Shift to remote work caught 72% of businesses technologically unprepared,” CIO Dive, June 17, 2020 <https://www.ciodive.com/news/remote-work-tech-challenges/579979/>.

⁶ “Latest Work-at-Home/Telecommuting/Mobile Work/Remote Work Statistics,” Global Workplace Analytics, March 13, 2020, accessed June 26, 2020, <https://globalworkplaceanalytics.com/telecommuting-statistics>.

⁷ Brie Weiler Reynolds, “159% Increase in Remote Work Since 2005: FlexJobs & Global Workplace Analytics Report,” FlexJobs, July 29, 2019, accessed June 26, 2020, <https://www.flexjobs.com/blog/post/flexjobs-gwa-report-remote-growth>.

⁸ Rachel Jay, “Top 100 Companies with Remote Jobs in 2020,” FlexJobs, January 12, 2020 <https://www.flexjobs.com/blog/post/100-top-companies-with-remote-jobs-2020/>.

⁹ Nick Kolakowski, “19 Most In-Demand Tech Jobs in Silicon Valley (and the Companies Hiring),” Dice, January 6, 2020 <https://insights.dice.com/2020/01/06/19-demand-tech-jobs-silicon-valley/>.

Remote work in the Far North

In January, EMSI, the labor force analytics company, looked at the concentration of remote work data throughout the nation by metropolitan statistical area (MSA). In Northern California, EMSI found that remote work had increased in the Clearlake, Chico, and Yuba City MSAs over the past 10 years, but declined in MSAs farther to the north.¹⁰

Specifically, remote work declined in these MSAs:

- Eureka-Arcata-Fortuna, 3,055 remote workers in 2018, a -0.2% decrease since 2010
- Redding, 3,119 workers, -2.4%
- Ukiah, 3,257 workers, -0.8%

However, remote work increased in these MSAs:

- Clearlake, 4,099 workers, 5.2%
- Chico, 6,539 workers, 1.4%
- Yuba City, 4,086 workers, 2.4%

This information may be particularly useful for Butte College whose service area is the Chico MSA where remote work slightly increased before the pandemic. Remote work declined by .8 percent in the Ukiah MSA, which encompasses Mendocino County. While data was not available for Lassen County, remote work in the Reno, Nevada MSA increased 4.4%, with 10,641 remote workers employed in 2018.



¹⁰ Clare Coffey, "The Future of Remote Work: Five Things You Need to Know About the Labor Market Shift," EMSI, March 31, 2020, accessed June 26, 2020, <https://www.economicmodeling.com/2020/03/31/the-future-of-remote-work>.

METHODOLOGY

The research team conferred with JFF and the Regional Director of Employer Engagement for ICT/Digital Media to collect information about the Google IT Support Professional Certificate, its training opportunities, and alignment with existing community college programs. The occupations identified in this report were selected by analyzing O*NET job descriptions and job posting data from Burning Glass. EMSI was used to determine job numbers and occupational projections as well as current employment and projected workforce demand. Also using EMSI, industry staffing patterns were analyzed to determine the concentration of occupations within specific industry sectors. Data from Burning Glass was used to determine which skills are most often associated with the occupations studied in this report. Given that some colleges are considering integrating the certificate into existing curriculum, a postsecondary supply analysis was conducted. Program offerings and award data were sourced from CCCCO Datamart and the Chancellor's Office Curriculum Inventory System (COCI).



OCCUPATIONAL OVERVIEW

Occupational alignment

Using the Standard Occupational Classification (SOC) System, the Center of Excellence identified three occupations that encompass the job titles identified by Google and JFF for the a Google IT Support Professional Certificate (Exhibit 1). It is important to note that two of the occupations—computer user support specialists and computer network support specialists—are considered entry-level jobs while network and computer systems administrators is considered a higher-level management/supervisory position. Appendix B describes the job functions of each of the three occupations in detail and provides a longer list of job titles associated with each occupation.

There is some distinction between computer user support specialists and computer network support specialists. Computer user support specialists typically provide technical assistance to computer users, answering questions and resolving computer problems. In contrast, computer network support specialists typically troubleshoot and perform maintenance on computer network systems. Much of a network and computer systems administrator's job revolves around monitoring Internet and network systems and ensuring network availability, performance quality, and appropriate security measures for users. This occupation typically supervises computer user support specialists and computer network support specialists.

Exhibit 1. Alignment between occupational titles and JFF job titles

SOC Title and Code	Google/JFF Job Title
Computer User Support Specialists (15-1151.00)	<ul style="list-style-type: none">• IT Support Technician• Help Desk Specialist• IT Desktop Support Tech• IT Service Desk Specialist• Support Specialist• Desktop Support Analyst• Help Desk Tier 2 Support• IT Desktop Technician• End user support
Computer Network Support Specialists (15-1152.00)	<ul style="list-style-type: none">• IT Support Analyst Desktop Support
Network and Computer Systems Administrators (15-1142.00)	<ul style="list-style-type: none">• IT Desktop Administrator• Field Service Technician• Junior Network Administrator• Desktop Support Administrator• IT Field Technician

Educational attainment

When evaluating the efficacy of the Google IT Professional Certificate, the educational attainment that employers typically require for workers entering these occupations should be considered.

These three occupations are solidly middle-skill occupations and are relevant to community college education. In all three occupations, about 40% of workers have educational attainment of an associate degree or have completed some college, no degree. Within that category, about 15-16% of workers in all three occupations hold an associate degree. Another 40% of workers in each occupation hold a bachelor's degree. (A breakdown of educational attainment can be found in Appendix B.)

A small percentage of employers hire workers who only have a high school diploma. Similarly, a small percentage of employers employ workers with a master's degree in these positions.

- Among computer user support specialists, nearly 38% have a bachelor's degree, and 25% have completed some college, no degree.
- The same numbers apply to computer network support specialists.
- A higher percentage of network and computer systems administrators have a bachelor's degree, 40%, while 23% have completed some college, no degree.



OCCUPATIONAL WAGES

In the North/Far North region, all three occupations pay well compared to many other middle-skill occupations. Their entry-level wages are above the living wage for one adult, which is \$11.62/hour in the region. The entry-level wages of computer network support specialists, and network and computer systems administrators are also above the living wage for a one-child, one-adult household, \$25.06/hour in the region.

Far North wages

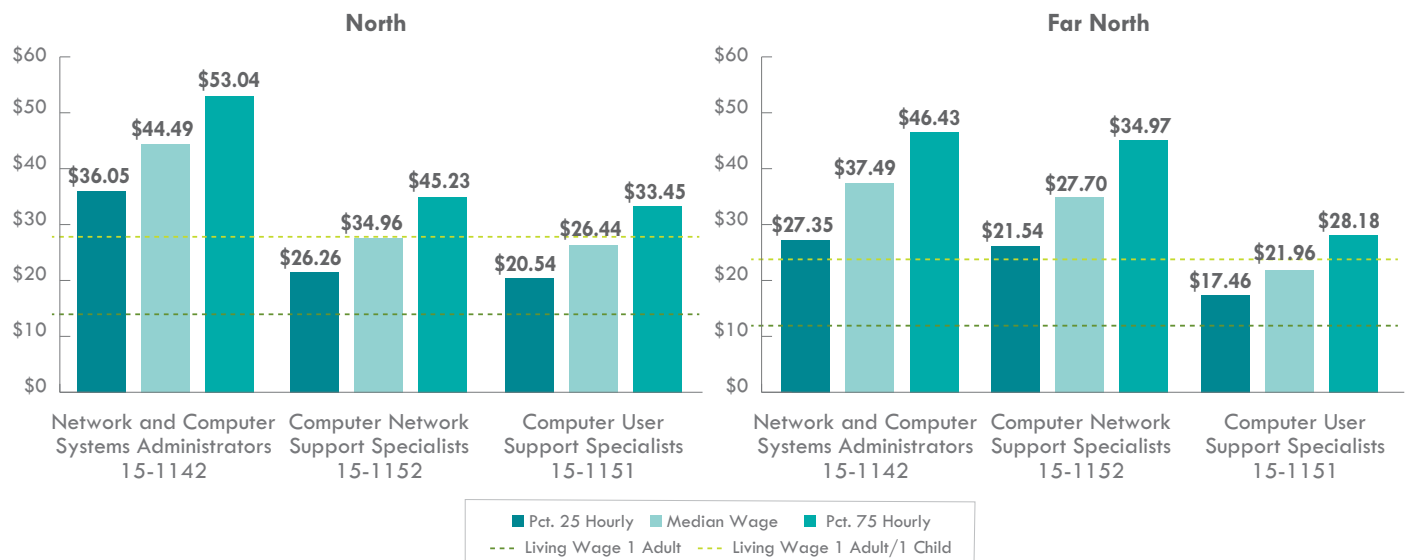
Overall, network and computer systems administrators earn the highest entry-level wages which likely reflects the supervisory/management aspect of this occupation, \$36.05/hour in the North subregion and \$27.35/hour in the Far North subregion (Exhibit 2).

Of the three occupations, computer user support specialists earn the lowest wages. They earn an entry-level wage of \$20.54/hour in the North subregion and \$17.46/hour in the Far North.

The wages of computer network support specialists fall in the middle. Their entry-level wage is \$26.26/hour in the North subregion and \$21.54/hour in the Far North. Wages are consistently lower in the Far North subregion.

Wages tend to be higher in the North region, which encompasses the Greater Sacramento area where the cost of living is higher. A comparison of subregions in the Far North shows there does not appear to be a pattern affecting wage amounts based on geography.

Exhibit 2. Wages for the three occupations in the North/Far North region



Statewide wages

Although these three occupations cross many different industries due to the universal nature of the tasks performed, worker pay varies considerably by region.

Median wages for computer user support specialists typically ranges from \$20/hour to \$30/hour. Employers in the Far North pay the lowest median wage, \$21.96/hour, followed by the Central Valley/Mother Lode region, \$24.39/hour (Exhibit 3). The regions with the highest wages for this occupation are the Bay Area, \$34.79/hour, and San Diego/Imperial region, \$28.17/hour.

For computer network support specialists, median wages are highest in the Bay Area, \$38.94/hour, and South Central Coast region, \$35.57/hour. Elsewhere, median wages range from a low of \$27.70/hour in the Far North, \$28/hour in the Inland Empire/Desert region, and up to \$34.96/hour in the North (Greater Sacramento) subregion.

Median wages for network and computer systems administrators are highest in the Bay Area, \$49.06/hour, followed by the North (Greater Sacramento) subregion, \$44.49/hour. Median wages hover around \$43.50/hour in the Los Angeles/Orange County region and San Diego/Imperial region. The median wage in the Far North is the lowest of all the regions for network and computer systems administrators, \$37.49/hour.

Exhibit 3. Wages for the three occupations in the state's macroregions

Occupation	Entry Level Wage	Median Wage	Experience Wage	Self-Sufficiency Wage – 1 adult	Self-Sufficiency Wage – 1 adult, 1 child
North/Far North					
Network and Computer Systems Administrators	\$34.61	\$43.44	\$52.26	\$11.62	\$25.06
Computer User Support Specialists	\$19.59	\$25.47	\$32.50	\$11.62	\$25.06
Computer Network Support Specialists	\$25.01	\$33.30	\$43.44	\$11.62	\$25.06
Bay Area					
Network and Computer Systems Administrators	\$38.27	\$49.06	\$63.71	\$20.99	\$42.43
Computer User Support Specialists	\$26.72	\$34.79	\$45.15	\$20.99	\$42.43
Computer Network Support Specialists	\$29.33	\$38.94	\$49.61	\$20.99	\$42.43
Central Valley/Mother Lode					
Network and Computer Systems Administrators	\$30.10	\$39.31	\$47.62	\$11.43	\$24.39
Computer User Support Specialists	\$19.37	\$24.39	\$30.83	\$11.43	\$24.39
Computer Network Support Specialists	\$25.66	\$31.58	\$38.12	\$11.43	\$24.39
South Central Coast					
Network and Computer Systems Administrators	\$31.21	\$40.12	\$49.76	\$16.99	\$33.82
Computer User Support Specialists	\$20.73	\$26.52	\$33.41	\$16.99	\$33.82
Computer Network Support Specialists	\$27.04	\$35.57	\$44.65	\$16.99	\$33.82
Los Angeles/Orange County					
Network and Computer Systems Administrators	\$33.97	\$43.47	\$54.28	\$18.20	\$36.26
Computer User Support Specialists	\$21.07	\$26.98	\$34.72	\$18.20	\$36.26
Computer Network Support Specialists	\$25.36	\$32.47	\$42.38	\$18.20	\$36.26
Inland Empire/Desert					
Network and Computer Systems Administrators	\$30.39	\$38.48	\$50.43	\$12.68	\$25.45
Computer User Support Specialists	\$19.54	\$26.11	\$34.08	\$12.68	\$25.45
Computer Network Support Specialists	\$22.76	\$28.00	\$37.23	\$12.68	\$25.45
San Diego/Imperial					
Network and Computer Systems Administrators	\$35.22	\$43.54	\$53.83	\$14.05	\$29.28
Computer User Support Specialists	\$23.05	\$28.17	\$34.75	\$14.05	\$29.28
Computer Network Support Specialists	\$23.92	\$32.75	\$42.39	\$14.05	\$29.28

OCCUPATIONAL DEMAND

North/Far North employment and projected outlook

In 2019, the three occupations related to the Google IT certificate accounted for more than 8,000 jobs (Exhibit 4). More than 6,500 of these jobs were located in the North (Greater Sacramento) subregion. In comparison, there were 1,528 jobs in the Far North subregion. Projected job growth for the three occupations is moderate, 7% in the North and 5% in the Far North. Overall, the North/Far North region is projected to have 770 annual openings over the next five years. Of those, 143 annual openings will be in the Far North subregion. (Please note that the projections are derived from EMSI which currently does not factor in the economic disruption caused by the Covid-19 pandemic.)

In the Far North and North subregions, computer user support specialists comprise the greatest number of jobs, out of the three occupations studied. This occupation is also projected to have the greatest number of annual openings over the next five years. Please refer to Appendix C for annual openings by county.

Exhibit 4. Employment and projections for the three occupations in the North/Far North region

Occupation	2019 Jobs	2024 Jobs	2019-2024 Change	2019-2024 % Change	Annual Openings
Far North Region					
Network and Computer Systems Administrators	346	369	23	7%	30
Computer User Support Specialists	941	988	47	5%	90
Computer Network Support Specialists	241	253	12	5%	23
Subtotal	1,528	1,610	82	5%	143
North Region					
Network and Computer Systems Administrators	1,825	1,915	90	5%	149
Computer User Support Specialists	3,670	3,981	311	8%	377
Computer Network Support Specialists	1,071	1,126	55	5%	101
Subtotal	6,567	7,021	454	7%	627
North/Far North Region					
Network and Computer Systems Administrators	2,171	2,284	113	5%	179
Computer User Support Specialists	4,611	4,969	358	8%	467
Computer Network Support Specialists	1,312	1,378	66	5%	124
Total	8,095	8,631	536	7%	770

The analysis also broke out the two support occupations to get a clearer picture of occupational demand in the North/Far North region. Overall, there are more annual openings for the two support occupations, a total of 587, compared to 147 annual openings for the single supervisory position—network and computer systems administrators. In the North (Greater Sacramento) subregion, annual openings are concentrated in Sacramento County, 279, Yolo County, 84, and Placer County, 71 (Exhibits 5 and 6). In the Far North, annual openings are greatest in Northern Inland subregion, with 40 annual openings projected for Butte County, and 24 projected for Shasta County.

Exhibit 5. Comparison of annual openings for support occupations in North/Far North subregions

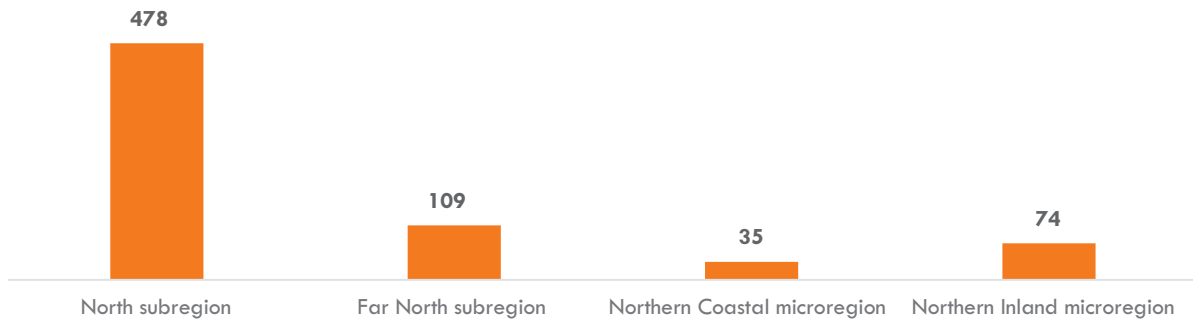


Exhibit 6. Annual openings for support occupations in the North/Far North region

Region/County	Annual Openings
North	478
El Dorado	22
Nevada	9
Placer	71
Sacramento	279
Sutter	6
Yolo	84
Yuba	7
Northern Coastal	35
Del Norte	2
Humboldt	21
Lake	4
Mendocino	7
Northern Inland	74
Butte	40
Colusa	0
Glenn	0
Lassen	2
Modoc	0
Plumas	0
Shasta	24
Sierra	0
Siskiyou	4
Tehama	3
Trinity	0
Total	587

Just as for the support occupations, annual openings for network and computer systems administrators are more concentrated in the Greater Sacramento (North) region. Sacramento County has the greatest number of projected annual openings, 95, followed by Placer County, 24, and Yolo County, 15 (Exhibits 7 and 8). In the Far North, the Northern Inland subregion has the most annual openings, 17, compared to the Northern Coastal subregion, 15. Butte County is expected to have nine annual openings, while Shasta County is projected to have eight.

Exhibit 7. Comparison of annual openings for the supervisory/administration occupation in North/Far North subregions

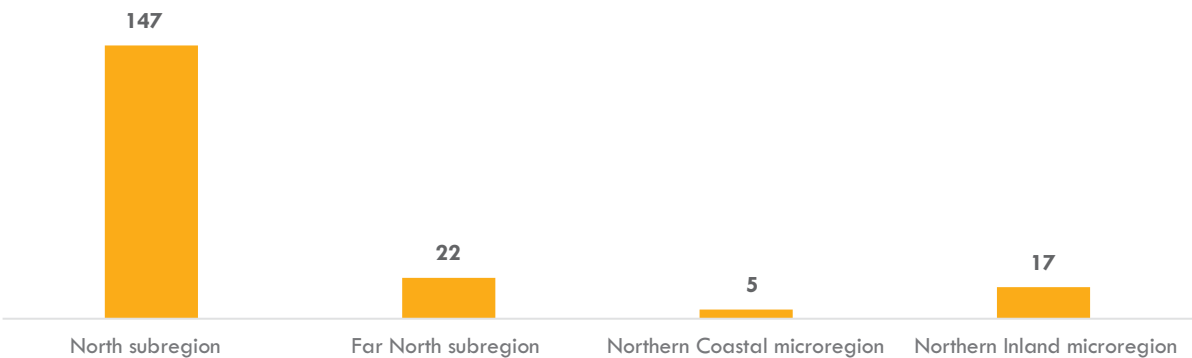


Exhibit 8. Annual openings for the supervisory/administration occupation in the North/Far North region

Region/County	Annual Openings
North Subtotal	147
El Dorado	7
Nevada	3
Placer	24
Sacramento	95
Sutter	0
Yolo	15
Yuba	3
Northern Coastal Subtotal	5
Del Norte	0
Humboldt	5
Lake	0
Mendocino	0
Northern Inland Subtotal	17
Butte	9
Colusa	0
Del Norte	0
Glenn	0
Lassen	0
Plumas	0
Shasta	8
Sierra	0
Siskiyou	0
Tehama	0
Trinity	0
Total	169

Statewide employment and projected outlook by region

The study also analyzed the outlook for related occupations by region in California and statewide. In California in 2019 there were more than 144,000 jobs in the three occupations (Exhibit 9). Regions with the greatest number of related jobs were the Bay Area (54,129 jobs), Los Angeles/Orange County (47,913 jobs), and San Diego/Imperial (10,505 jobs). By comparison, the North/Far North region accounts for the fourth greatest number of jobs, 8,095.

As in the North/Far North region, the occupation with the largest number of jobs across all regions is computer user support specialists. The Bay Area employs the greatest number of these workers in the state, 32,742, followed by Los Angeles/Orange County, 27,521. Of the three occupations, job numbers are lowest for the computer network support specialists.

Exhibit 9. Employment and projections for the three occupations by region and in California

Occupation	2019 Jobs	2024 Jobs	2019-2024 Change	2019-2024 % Change	Annual Openings
Bay Area					
Network and Computer Systems Administrators	14,596	16,415	1,819	12%	1,452
Computer User Support Specialists	32,742	37,732	4,990	15%	3,889
Computer Network Support Specialists	6,791	7,801	1,010	15%	800
Subtotal	54,129	61,947	7,818	14%	6,141
Central Valley/Mother Lode					
Network and Computer Systems Administrators	1,506	1,598	92	6%	128
Computer User Support Specialists	3,308	3,588	280	8%	342
Computer Network Support Specialists	868	921	53	6%	85
Subtotal	5,681	6,107	426	7%	554
South Central Coast					
Network and Computer Systems Administrators	1,016	1,080	64	6%	87
Computer User Support Specialists	2,568	2,760	192	7%	257
Computer Network Support Specialists	726	768	42	6%	70
Subtotal	4,311	4,608	297	7%	413
Los Angeles/Orange County					
Network and Computer Systems Administrators	13,553	13,942	389	3%	1,043
Computer User Support Specialists	27,521	29,363	1,842	7%	2,699
Computer Network Support Specialists	6,838	7,141	303	4%	634
Subtotal	47,913	50,446	2,533	5%	4,376
Inland Empire/Desert					
Network and Computer Systems Administrators	1,822	1,948	126	7%	158
Computer User Support Specialists	3,792	4,123	331	9%	390
Computer Network Support Specialists	1,089	1,167	78	7%	108
Subtotal	6,703	7,238	535	8%	656
San Diego/Imperial					
Network and Computer Systems Administrators	3,264	3,501	237	7%	285
Computer User Support Specialists	5,838	6,435	597	10%	623
Computer Network Support Specialists	1,402	1,534	132	9%	147
Subtotal	10,505	11,470	965	9%	1,055
California					
Network and Computer Systems Administrators	39,774	42,989	3,215	8%	3,549
Computer User Support Specialists	84,495	94,026	9,531	11%	9,229
Computer Network Support Specialists	19,976	21,867	1,891	9%	2,095
Total	144,245	158,882	14,637	10%	14,873

INDUSTRY OVERVIEW

As mentioned earlier, the three IT occupations are needed in just about every industry, but the study sought to quantify in which industries these occupations are more concentrated. To determine the prevalence of these occupations by industry an inverse staffing pattern analysis was conducted. Inverse staffing patterns identify the industries currently employing an occupation and can shed light on those industries that are likely to be hiring due to growth or displacing workers due to contraction. The analysis divided the occupations into two groups: one group contains the support occupations (computer user support specialists and computer network support specialists) while the other contains the supervisory/management occupation (network and computer systems administrators).

Across California, many different industries employ the three occupations, but these occupations are concentrated in larger amounts in a handful of specific industries. Both occupational groups are the most concentrated in the computer systems design and related services industry (Exhibit 10). Both are also present, although not as substantially, in the education industries, as well as local government and state government. It is important to note that contraction is projected in the education (local government) industry for the support occupations, representing a loss of 280 jobs through 2024. The support occupations have some degree of concentration in the software publishers industry, and colleges, universities, and professional schools. By contrast, network and computer system administrators are present in the management of companies and enterprises industry, and the data processing, hosting, and related services industry.

Exhibit 10. Inverse staffing patterns for the two occupational groupings, California¹¹

Industry	2019 Jobs	2024 Jobs	2019-2024 Change	2019-2024 % Change	% of Industry (2019)
Computer Support Occupations					
Computer Systems Design and Related Services	25,055	30,198	5,143	21%	24.0%
Education (Local Government)	6,719	6,439	(280)	(4%)	6.4%
Education (State Government)	5,665	6,405	740	13%	5.4%
Software Publishers	5,312	6,606	1,294	24%	5.1%
Colleges, Universities, and Professional Schools	4,051	4,527	476	12%	3.9%
Supervisory/Management Occupation					
Computer Systems Design and Related Services	8,465	10,217	1,752	21%	21.3%
Management of Companies and Enterprises	2,265	2,392	127	6%	5.7%
Local Government, Excluding Education and Hospitals	1,742	1,783	41	2%	4.4%
Education (Local Government)	1,287	1,308	21	2%	3.2%
Data Processing, Hosting, and Related Services	1,157	1,559	402	35%	2.9%

¹¹ EMSI 2020.2. QCEW, non-QCEW, and self-employed.

Top industries by macroregion

A closer examination of industries in which these occupations are most prevalent by state macroregion shows that for the two occupational groups the computer systems design and related services industry typically has the greatest concentration of these jobs.

In the Bay Area, support occupations comprise about 5% of the computer and peripheral equipment manufacturing industry and the data processing, hosting, and related services industry. In the Los Angeles/Orange County region, they make up about 4% of the management of companies and enterprises industry. In several regions, a small concentration of support occupations is found in the employment services industry: North/Far North, Central Valley/Mother Lode, Inland Empire/Desert, and Los Angeles/Orange County.

Regarding the supervisory/management occupational group (network and computer systems administrators), the other information services industry is among the top industries in the Bay Area, but not in any other macroregion. Similarly, scientific research and development services is among the top industries in the San Diego/Imperial region alone.

The macroregion analysis shows that in more rural areas, the two occupational groupings are employed in education and government whereas in more urban areas, these occupations are employed in the computer and design related services industry. This trend is particularly apparent for both occupational groupings when we look at the North/Far North region where the top industries are:

- Education and hospitals (state government)
- Education and hospitals (local government)
- State government, excluding education and hospitals
- Local government, excluding education and hospitals

North/Far North computer support

In the North region, the greatest number of computer support occupations are in computer design and related services, and education (state government) (Exhibit 11). By comparison, the top two industries for the support occupations in the Far North region are education (local government) and local government, excluding education and hospitals. In the North region, employment contraction is projected in state government, excluding education and hospitals, and education (local government). Similarly, in the Far North, contraction is projected in education (local government).



Exhibit 11. Inverse staffing patterns for the occupational support grouping, North/Far North¹²

Industry	2019 Jobs	2014 Jobs	2019-2024 Change	2019-2014 % Change	% of Industry (2019)
North (Greater Sacramento) Region					
Computer Systems Design and Related Services	735	876	141	19%	15.5%
Education (State Government)	634	710	76	12%	13.4%
State Government, Excluding Education and Hospitals	496	486	(10)	(2%)	10.5%
Education (Local Government)	429	416	(13)	(3%)	9.0%
Local Government, Excluding Education and Hospitals	229	239	10	4%	4.8%
Far North Region					
Education (Local Government)	199	184	(15)	(8%)	16.8%
Local Government, Excluding Education and Hospitals	148	156	8	5%	12.5%
Education (State Government)	126	144	18	14%	10.6%
Computer Systems Design and Related Services	104	106	2	2%	8.8%
State Government, Excluding Education and Hospitals	47	50	3	6%	3.9%

North/Far North supervisory/management

In the North region, the top industry employing network and computer system administrators is state government, excluding education and hospitals (Exhibit 12). However, within this industry, this occupation is projected to contract by 4% over the next five years. In the Far North region, the top industry employing network and computer system administrators is local government, excluding education and hospitals. Two industries in the Far North are projected to eliminate positions for network and computer system administrators: education (local government), and computer systems design and related services.

Exhibit 12. Inverse staffing patterns for the supervisory/management grouping, North/Far North¹³

Industry	2019 Jobs	2014 Jobs	2019-2024 Change	2019-2014 % Change	% of Industry (2019)
North (Greater Sacramento) Region					
State Government, Excluding Education and Hospitals	257	246	(11)	(4%)	14.1%
Computer Systems Design and Related Services	238	282	44	18%	13.0%
Local Government, Excluding Education and Hospitals	134	137	3	2%	7.3%
Management of Companies and Enterprises	98	101	3	3%	5.4%
Education (Local Government)	84	86	2	2%	4.6%
Far North Region					
Local Government, Excluding Education and Hospitals	66	69	3	5%	19.1%
Education (Local Government)	31	30	(1)	(3%)	8.9%
Computer Systems Design and Related Services	26	25	(1)	(4%)	7.5%
Management of Companies and Enterprises	21	22	1	5%	5.9%
State Government, Excluding Education and Hospitals	19	20	1	5%	5.4%

¹² EMSI 2020.2. QCEW, non-QCEW, and self-employed.

¹³ EMSI 2020.2. QCEW, non-QCEW, and self-employed.

SKILLS OVERVIEW

There are 12 skills listed on Coursera's website for the Google IT Support Professional Certificate.¹⁴ The research team sought to verify which skills are most often associated with the two occupational support occupations and the one supervisory/management occupation. The skills listed for the certificate by Coursera are:

- Binary Code
- Customer Support
- Linux
- Troubleshooting
- Domain Name System (DNS)
- Ipv4
- Network Model
- Powershell
- Linux File Systems
- Command-Line Interface
- Directory Service
- Lightweight Directory Access Protocol (LDAP)

To determine which skills are most often associated with these occupations, an analysis of job postings using Burning Glass Labor Insights was conducted for the 22-county North/Far North region. Job postings from the last 18 months that were advertised between January 2019 and June 2020 were analyzed.

Computer support occupations

In the North/Far North, 4,413 job postings for computer user support specialists and computer network support specialists were identified. Among those, 92.5% (4,083 job postings) were for computer user support specialists, and 7.5% (330 job postings) were for computer network specialists. The two occupations share two top skills: technical support and customer service (Exhibit 13). Other top skills for computer user support specialists are repair, help desk support, and printers. For computer network support specialists, other top skills are network administration, network support, and Cisco. The top skills of Linux and Domain Name System for the computer network support occupation listed in job postings match the Coursera skills, indicating this occupation might be better aligned with the Google IT certificate than the computer user support specialist occupation.



¹⁴ "Google IT Support Professional Certificate," Coursera, 2020, accessed July 27, 2020, https://www.coursera.org/professional-certificates/google-it-support?utm_source=googleit&utm_medium=institutions&utm_campaign=gwgsite.

Exhibit 13. Most in-demand skills for computer support occupations, North/Far North region

Occupation	Job Postings	Share
Computer User Support Specialists	4,083	100%
Technical Support	1,793	44%
Customer Service	1,317	32%
Repair	993	24%
Help Desk Support	918	22%
Printers	635	16%
Hardware and Software Installation	604	15%
It Support	533	13%
Microsoft Active Directory	485	12%
Customer Contact	478	12%
Hardware Troubleshooting	424	10%
Occupation	Job Postings	Share
Computer Network Support Specialists	330	100%
Network Administration	90	27%
Customer Service	86	26%
Technical Support	82	25%
Network Support	62	19%
Cisco	61	18%
Routers	59	18%
Linux	56	17%
System/Network Configuration	54	16%
UNIX	52	16%
Domain Name System (DNS)	51	15%

The analysis also looked at certifications that were most requested by employers in job postings. Exhibit 14 shows the certifications most in demand for these occupations in the North/Far North region. For the two support occupations, the most requested certifications were Certified A+ Technician, CompTIA Network+, and IT Infrastructure Library (ITIL) Certification. However, it is important to note that 69% of the 4,413 job postings did not include or mention a certification requirement. Therefore, these results may not be representative and cannot be generalized to the broader occupational grouping. While these results may not be representative, they characterize commonly seen and requested industry certifications, and these certifications may help workers advance in their jobs.

Exhibit 14. Most in-demand certifications for computer support occupations, North/Far North region

Certifications	Job Postings	Share of job postings
Certified A+ Technician	387	28%
CompTIA Network+	164	12%
IT Infrastructure Library (ITIL) Certification	152	11%
Security Clearance	122	9%
Microsoft Certified Professional (MCP)	102	7%
Cisco Certified Network Associate (CCNA)	82	6%
CompTIA Security+	78	6%
Microsoft Certified Solutions Expert (MCSE)	77	6%
Microsoft Certified Solutions Associate (MCSA)	54	4%
ITIL Certification	51	4%

Supervisory/management occupation

In the North/Far North region, 1,671 job postings were identified for network and computer systems administrators in the last 18 months. The most commonly requested in-demand skills were system administration, Microsoft Active Directory, and VMware. Linux and domain name system align with the Google IT Certificate's listed skills (Exhibit 15).

Exhibit 15. Most in-demand skills for network and computer systems administrators, North/Far North region

Occupation	Job Postings	Share
System Administration	788	49%
Microsoft Active Directory	478	30%
VMware	418	26%
Linux	416	26%
Windows Server	331	21%
SQL	323	20%
Technical Support	291	18%
Hardware and Software Installation	264	16%
Project Management	252	16%
Domain Name System (DNS)	247	15%

Two-thirds of job postings did not mention a required certification; however, they represent commonly requested certifications and are industry standards. Aside from a driver's license or security clearance, the top three certifications for the supervisory/management occupation are CompTIA Security+, Microsoft Certified Solutions Associate (MCSA), and Cisco Certified Network Associate (CCNA) (Exhibit 16). While Cisco is listed as a top skill and certification for computer network support specialist, and network and computer system administrators, it is not listed as a skill on the Coursera website.

Exhibit 16. Most in-demand certifications for network and computer system administrators, North/Far North region

Certification	Job Postings	Share of job postings
Security Clearance	147	27%
CompTIA Security+	146	27%
Driver's License	108	20%
Microsoft Certified Solutions Associate (MCSA)	85	15%
Cisco Certified Network Associate (CCNA)	77	14%
Certified Information Systems Security Professional (CISSP)	75	14%
IT Infrastructure Library (ITIL) Certification	56	10%
Microsoft Certified Solutions Expert (MCSE)	53	10%
Cisco Certified Network Professional (CCNP)	43	8%
VMware Certified Professional (VCP)	34	6%



Common skill clusters for the IT occupations

A side-by-side comparison of skill clusters between the two groups of occupations was conducted. Skill clusters are broader categories of skills that are grouped together based on similar functions, how skills travel together in job postings, and skill sets that can be trained together. For instance, Information technology (IT) is a skill cluster that tracks skills related to developing computer programs or computer systems. This cluster is important for both support and administration jobs.

A wider variety of skill clusters apply to the support occupations. Skill clusters that are only associated with the support occupations include two information technology skill clusters: help desk support and basic computer knowledge. A third skill cluster is administration: office machines.

Common skill clusters for the support occupations are:

- Information Technology: Technical Support
- Customer and Client Support: Basic Customer Service
- Information Technology: Microsoft Office and Productivity Tools
- Information Technology: Network Configuration

The skill clusters associated with network and computer systems administration are predominantly information technology related. The skills that solely apply to this occupation are virtual machines (VM), scripting, cloud solutions, and network file systems (NFS).

Top skills clusters for the supervisory/management occupation are:

- Information Technology: Systems Administration
- Information Technology: Operating Systems
- Information Technology: Network Configuration
- Information Technology: Technical Support

POSTSECONDARY SUPPLY

Analysis of program data from the California Community Colleges Chancellor's Office Data Mart and Curriculum Inventory System (COCI) yielded a number of programs that align or complement the Google IT certificate.

Strongly aligned programs

There are four programs that are strongly aligned with the Google IT certificate. These programs train students to enter the three occupations discussed in this report.

Generally, the North region leads the Far North in the number of awards conferred across all four programs (Exhibit 17). The North confers 85 awards on average each year in Computer Infrastructure and Support, and 94 awards in computer networking. The Far North confers the most awards of the two regions in computer information systems, 48 awards on average each year. The analysis shows an opportunity area for Far North colleges to add new programs and attract more students to complete existing programs in computer infrastructure and support, and computer networking (Exhibit 18). The Far North colleges should consider offering a computer support program as there are currently no offerings related to this program in the region.

Exhibit 17. Three-year average awards for programs strongly aligned with the Google IT certificate in the North and Far North

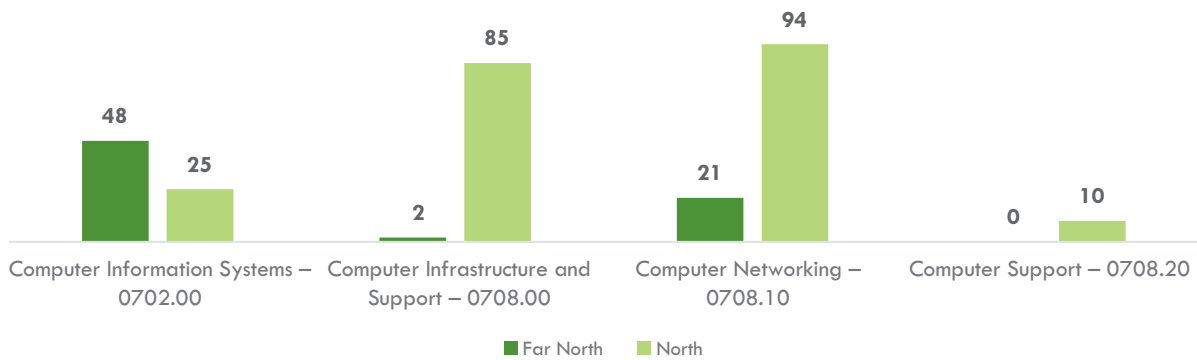


Exhibit 18. North and Far North colleges offering programs strongly aligned with the Google IT certificate

Programs	Far North Colleges	North Colleges	Total Programs
Computer Information Systems – 0702.00	<ul style="list-style-type: none"> Butte Mendocino Shasta 	<ul style="list-style-type: none"> Cosumnes River Sacramento City Sierra 	6
Computer Infrastructure and Support – 0708.00	<ul style="list-style-type: none"> Redwoods 	<ul style="list-style-type: none"> American River Cosumnes River Sacramento City Sierra 	5
Computer Networking – 0708.10	<ul style="list-style-type: none"> Mendocino Redwoods Shasta 	<ul style="list-style-type: none"> American River Cosumnes River Lake Tahoe Sacramento City Sierra Yuba 	9
Computer Support – 0708.20		<ul style="list-style-type: none"> American River Cosumnes River Sacramento City Sierra 	4

Somewhat aligned programs

There are six programs that are somewhat aligned with the Google IT certificate and that also present opportunities for community college training in the Far North region (Exhibit 19). The programs show a low number of awards conferred in the Far North region. Of the six programs, computer science has the most awards conferred on average each year in the Far North, a total of 17. The Far North community colleges should consider offering a computer systems analysis program (Exhibit 20). Several Far North colleges offer computer science programs, but awards are relatively low in comparison. The same pattern exists for world wide web administration, computer programming, computer software development, and information technology, general.

Exhibit 19. Three-year average awards for programs somewhat aligned with the Google IT certificate in the North and Far North

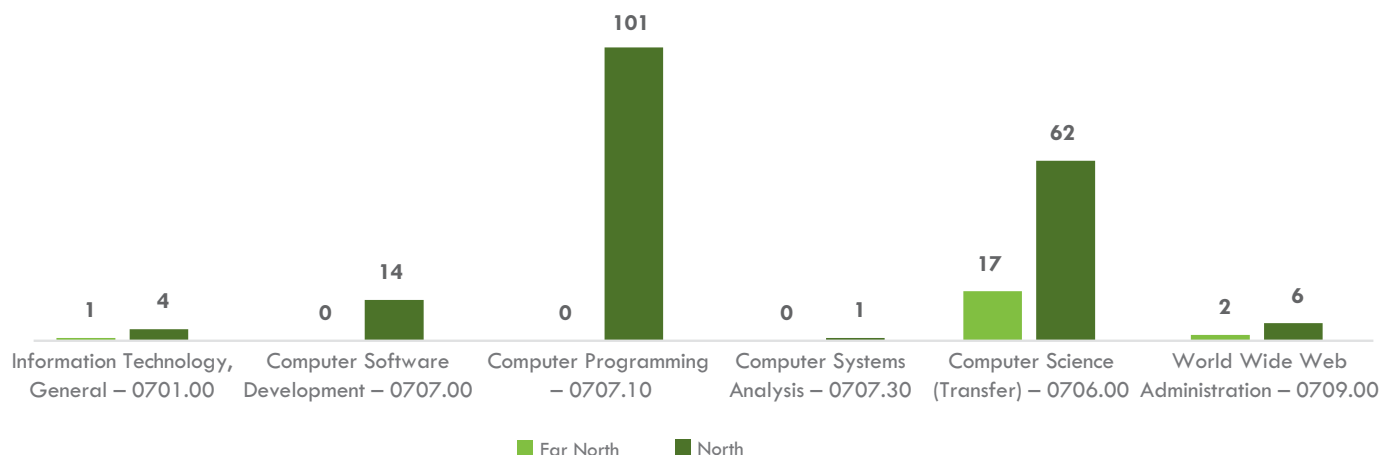


Exhibit 20. North and Far North colleges offering programs somewhat aligned with the Google IT certificate

Programs	Far North Colleges	North Colleges	Total Programs
Information Technology, General – 0701.00	<ul style="list-style-type: none"> Mendocino 	<ul style="list-style-type: none"> Cosumnes River Folsom Lake 	3
Computer Software Development – 0707.00	<ul style="list-style-type: none"> Feather River 	<ul style="list-style-type: none"> Cosumnes River Folsom Lake Sacramento City 	4
Computer Programming – 0707.10	<ul style="list-style-type: none"> Redwoods 	<ul style="list-style-type: none"> American River Cosumnes River Folsom Lake 	4
Computer Systems Analysis – 0707.30		<ul style="list-style-type: none"> Sierra 	1
Computer Science (Transfer) – 0706.00	<ul style="list-style-type: none"> Butte Mendocino Shasta Siskiyou 	<ul style="list-style-type: none"> American River Cosumnes River Folsom Lake Sierra Yuba 	9
World Wide Web Administration – 0709.00	<ul style="list-style-type: none"> Shasta Siskiyou 	<ul style="list-style-type: none"> American River Sacramento City Sierra 	5



Additional program for consideration

One other program was identified that the Google IT certificate complements—agriculture business, sales and service. This program presents a cross-sector opportunity for community college training. It is possible that the Google IT certificate could augment the knowledge and skills gained by students enrolled in an agriculture business program to prepare them to enter occupations for which agriculture business trains them. On average this program confers 23 awards each year in the Far North (Exhibit 21). There are four colleges in the Far North that offer the program (Exhibit 22).

Exhibit 21. Three-year average awards for the program that complements the Google IT certificate in the North and Far North

Programs	Far North 3-year average awards	North 3-year average awards	Total Awards
Agriculture Business, Sales and Service – 0112.00	23	4	27

Exhibit 22. North and Far North colleges offering the program that complements the Google IT certificate

Programs	Far North Colleges	North Colleges	Total Programs
Agriculture Business, Sales and Service – 0112.00	<ul style="list-style-type: none"> Butte Lassen Redwoods Shasta 	<ul style="list-style-type: none"> Cosumnes River Woodland Yuba 	7

CONCLUSION & RECOMMENDATIONS

In the summer of 2020, the Far North Center of Excellence embarked on a study to determine the efficacy and need for occupations related to the Google IT Support Professional Certificate offered through Coursera. Community colleges across the nation, and at least two in California, are either offering training for the certificate or have braided the training into existing coursework. Several colleges in the Far North subregion have expressed interest in offering the certificate program.

In conducting the study, the COE first identified three occupations that correspond with the job titles identified by Google and JFF for the certificate—computer user support specialists, computer network support specialists, and network and computer systems administrators. Although the occupation of network and computer systems administrators corresponds to five job titles associated with the Google IT Support Professional Certificate, it is important to note that this occupation is supervisory/managerial, while the other two occupations are entry-level support positions, and Google has stated that the certificate program is designed to train for entry-level support positions. As such, network and computer systems administrators should be considered an occupation that workers could transition to once they have acquired a higher level of work experience.

In addition, these three occupations were identified as stable jobs which may even grow during the pandemic in the May 2020 report “Filling the Life Boats: Getting Americans Back to Work in the Pandemic” by Burning Glass. In the report, computer user support specialists is identified as a “feeder” occupation that leads to a “lifeboat” occupation, computer network support specialists, that leads to the “next-step” occupation of network and computer systems administrators.¹⁵

The COE’s analysis focused on employment and occupational demand for the three occupations in the North/Far North region, but given that these occupations may conduct work remotely, a statewide analysis of occupational demand and wages was also included. Postsecondary program offerings were assessed for the Far North and North (Greater Sacramento) subregions.

Compared to other regions of the state, entry-level wages for the three occupations tend to be lowest in the Far North subregion. However, these wages are substantially above the subregion’s living wage, and range from \$17.46/hour for entry-level computer user support specialists to \$27.34/hour for entry-level network and computer systems administrators. A statewide comparison shows the highest wages tend to be offered in the Bay Area. Other locations with higher wages include the North (Greater Sacramento) subregion and San Diego/Imperial region. This wage analysis offers important insights into how much students might earn if they complete the Google IT Support Professional Certificate since documentation has yet to be released showing how much students are earning who have completed the Google IT certificate through Coursera and obtained employment.

Statewide, employment for the three occupations is greatest in the Bay Area, followed by Los Angeles/Orange County, and San Diego/Imperial. In the North/Far North region, demand is greatest in the North (Greater Sacramento) subregion; however, there are enough annual openings in the Northern Coastal and Northern Inland subregions to merit community college programs training for these occupations. A total of 143 annual openings are projected for the three occupations in the Far North. Statewide, 144,245 workers were employed in the three occupations in 2019, and 14,873 annual openings are projected, representing a growth rate of 10%.

¹⁵ “Filling the Life Boats: Getting Americans Back to Work in the Pandemic,” Burning Glass, May 2020, accessed September 3, 2020, https://www.burning-glass.com/wp-content/uploads/2020/05/Lifeboat_Jobs_Burning_Glass.pdf.

Recommendations:

- **Some caution is advised before adopting and offering this certificate program.** Distance learning often yields high enrollment that rarely translates to a high number of completions. JFF has presented findings that students benefit more (have a higher likelihood of finishing) when offered both academic and job support services, and completion rates are higher when the certificate is embedded in a course or program. These approaches should be considered if a certificate program is offered.
- **This certificate presents an opportunity to meet increased demand during the pandemic for non-credit certificate programs.** Typically, more value is offered by earning this type of credential through a community college certificate or degree program, but during the pandemic, interest from adult learners from diverse and lower-income backgrounds is growing in earning short-term, online credentials.¹⁶ Offering the certificate through a non-credit program also would complement the recent request by the Strong Workforce Program for community colleges to focus on short-term programs that can upskill displaced workers in 4-12 weeks. Google clearly believes this type of certificate is the future of online skills training. Over the summer, it announced three more Google Career Certificates in addition to the Google IT Support Professional Certificate that can help job seekers immediately find employment and that Google's hiring process will consider the equivalent of a four-year degree for related positions.¹⁷
- **If the Google IT Support Professional Certificate is integrated into coursework offered by community colleges in the region, attention should be devoted to preparing students to enter the two support occupations identified in the study—computer user support specialists and computer network support specialists.** Occupational demand is greatest for these two support occupations which most closely align with the certificate. Based on the COE's analysis, it does not appear that the certificate perfectly aligns with any single occupation, but there is some overlap between the skills it is designed to train for and the skills required for the two support occupations. The certificate could be used to augment a student's resume when that student completes training to enter one of the occupations identified by the study.
- **There are several program opportunities which community colleges in the Far North subregion may choose to pursue.** The study identified four postsecondary programs that align with the certificate. The Far North colleges may want to attract more students to enter existing programs in computer infrastructure and support, and computer networking. Far North colleges should consider offering a computer support program.
- **The study also identified other programs that complement the certificate, but that do not perfectly align with it.** Far North colleges may want to consider offering a computer systems analysis program and increase enrollment or expand access to existing programs in computer science, world wide web administration, computer programming, computer software development, and information technology, general.
- **Public sector industries—namely local and state government, and education—employ a substantial number of the three occupations in the North/Far North region, and these industries should be targeted for pathways.** Although the three occupations are the most concentrated in the computer systems design and related services industry, the macroregion analysis shows that in more rural areas, these occupations tend to be concentrated in education and government industries. Coursework offered by community colleges should incorporate training for skill sets required by the education and government sectors and develop employment pathways into the region's top industries for the three occupations: education and hospitals (state government), education and hospitals (local government), state government, excluding education and hospitals; and local government, excluding education and hospitals. (Analysis also showed that employment services is an industry in which these occupations are concentrated. However, the employment services industry is likely appearing as a top industry in job postings because the job openings are for temporary positions at various companies.)

¹⁶ Paul Fain, "Alternative Credentials on the Rise," Inside Higher Ed, August 20, 2020, accessed August 31, 2020, https://www.insidehighered.com/news/2020/08/27/interest-spikes-short-term-online-credentials-will-it-be-sustained?utm_source=Inside+Higher+Ed&utm_campaign=032acf0cce-DNU_2020_COPY_02&utm_medium=email&utm_term=0_1fcbc04421-032acf0cce-236548166&mc_cid=032acf0cce&mc_eid=49e5de0bad.

¹⁷ Justin Bariso, "Google Has a Plan to Disrupt the College Degree," Inc. Magazine, August 19, 2020, accessed August 31, 2020, <https://www.inc.com/justin-bariso/google-plan-disrupt-college-degree-university-higher-education-certificate-project-management-data-analyst.html>.

APPENDIX A: DATA SOURCES AND REFERENCES

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APPENDIX B: OCCUPATIONAL DESCRIPTIONS AND EDUCATIONAL ATTAINMENT

Exhibit B1. SOC titles and codes, descriptions, and job titles for the three occupations

Occupational Title	Description	Job Titles
Computer User Support Specialists (15-1151.00)	Provide technical assistance to computer users. Answer questions or resolve computer problems for clients in person, or 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.	Computer Specialist, Computer Support Specialist, Computer Technician, Desktop Support Technician, Help Desk Analyst, Help Desk Technician, Information Technology Specialist (IT Specialist), Network Technician, Support Specialist, Technical Support Specialist
Computer Network Support Specialists (15-1152.00)	Analyze, test, troubleshoot, and evaluate existing network systems, such as local area network (LAN), wide area network (WAN), and Internet systems or a segment of a network system. Perform network maintenance to ensure networks operate correctly with minimal interruption.	Computer Network Specialist, IT Consultant (Information Technology Consultant), Network Engineer, Network Specialist, Network Support Specialist, Network Technical Analyst, Network Technician, Personal Computer Network Analyst, Senior IT Assistant (Senior Information Technology Assistant), Systems Specialist
Network and Computer Systems Administrators (15.1142.00)	Install, configure, and support an organization's local area network (LAN), wide area network (WAN), and Internet systems or a segment of a network system. Monitor network to ensure network availability to all system users and may perform necessary maintenance to support network availability. May monitor and test Web site performance to ensure Web sites operate correctly and without interruption. May assist in network modeling, analysis, planning, and coordination between network and data communications hardware and software. May supervise computer user support specialists and computer network support specialists. May administer network security measures.	Information Analyst, Information Systems Manager (IS Manager), Information Technology Specialist (IT Specialist), LAN Specialist (Local Area Network Specialist), Local Area Network Administrator (LAN Administrator), Network Administrator, Network Coordinator, Network Manager, Network Specialist, Systems Administrator

Exhibit B2. Educational attainment for the three occupations

Occupational Title	Less than high school diploma	High school diploma or equiv.	Some college, no degree	Associate degree	Bachelor's degree	Master's degree	Doctoral or prof. degree
Computer User Support Specialist (15-1151.00)	0.7%	9.2%	24.8%	16.3%	37.5%	10.2%	1.4%
Computer Network Support Specialist (15-1152.00)	0.7%	9.2%	24.8%	16.3%	37.5%	10.2%	1.4%
Network and Computer Systems Administrators (15.1142.00)	0.2%	7.5%	23.3%	15.0%	40.4%	12.4%	1.3%

APPENDIX C: NORTH/FAR NORTH ANNUAL OPENINGS BY COUNTY

Exhibit C1. Annual openings for the three occupations by county in the North/Far North region

Microregion	County Name	Total
North	El Dorado	29
	Nevada	12
	Placer	95
	Sacramento	374
	Sutter	8
	Yolo	99
	Yuba	10
	Subtotal	627
Northern Coastal	Del Norte	3
	Humboldt	26
	Lake	6
	Mendocino	8
	Subtotal	44
Northern Inland	Butte	49
	Colusa	0
	Glenn	0
	Lassen	3
	Modoc	0
	Plumas	0
	Shasta	32
	Sierra	0
	Siskiyou	5
	Tehama	4
	Trinity	0
	Subtotal	93
Total		764

Exhibit C2. North/Far North employment and occupational demand, all three occupations

County	Microregion	2019 Jobs	2024 Jobs	2019 - 2024 Change	2019 - 2024 % Change	Annual Openings
Sacramento	North	4,122	4,333	211	5%	374
Yolo	North	961	1,053	92	10%	99
Placer	North	894	995	101	11%	95
Butte	Northern Inland	532	558	26	5%	49
Shasta	Northern Inland	336	352	16	5%	32
El Dorado	North	275	307	32	12%	29
Humboldt	Northern Coastal	271	292	21	8%	26
Nevada	North	122	130	8	7%	12
Yuba	North	104	109	5	5%	10
Mendocino	Northern Coastal	100	102	2	2%	8
Sutter	North	88	93	5	6%	8
Lake	Northern Coastal	64	65	1	2%	6
Siskiyou	Northern Inland	55	59	4	7%	5
Tehama	Northern Inland	38	42	4	11%	4
Del Norte	Northern Coastal	37	38	1	3%	3
Lassen	Northern Inland	31	31	0	0%	3
Plumas	Northern Inland	20	21	1	5%	Insf. Data
Colusa	Northern Inland	15	17	2	13%	Insf. Data
Glenn	Northern Inland	14	16	2	14%	Insf. Data
Modoc	Northern Inland	<10	<10	Insf. Data	Insf. Data	Insf. Data
Sierra	Northern Inland	<10	<10	Insf. Data	Insf. Data	Insf. Data
Trinity	Northern Inland	<10	<10	Insf. Data	Insf. Data	Insf. Data

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