

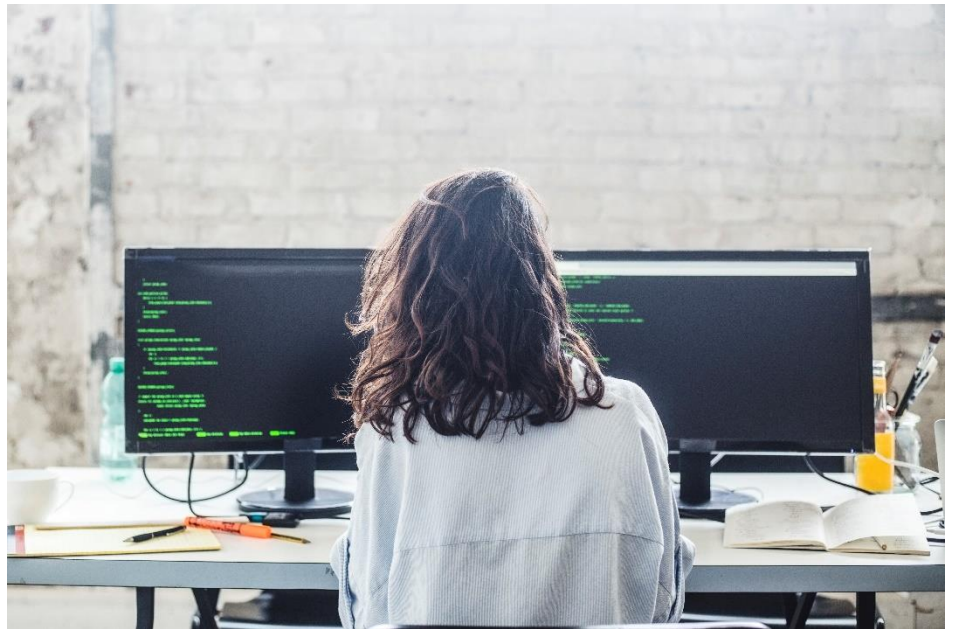
August 2022

Labor Market Analysis

Computer Programming



POWERED BY



Prepared by the Central Valley/Mother Lode Center of Excellence

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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.

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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 Programming. Three occupations related to Computer Programming were identified for Merced College:

- 15-1231, Computer Network Support Specialists
- 15-1251, Computer Programmers
- 15-1254, Web Developers

Key findings:

- **Occupational demand** — There were 770 workers employed in jobs related to Computer Programming in 2020 in the North Central Valley/Northern Mother Lode (NCV/NML) subregion. The largest occupation is computer network support specialists with 364 workers with a projected growth rate of 4% over the next five years, and 30 annual openings.
- **Wages** — Computer Programmers earn the highest entry-level wage, \$29.28/hour in the subregion.
- **Employers** — Employers with the most job postings in the subregion are Anthem Blue Cross, Centene Corporation, and T Mobile USA Incorporation.
- **Occupational titles** — The most common occupational title in job postings in the subregion is Web Developers. The most common job title is Backend Engineer.
- **Skills and certifications** — The top baseline skill is writing, the top specialized skill is software engineering, and the top software skill is software engineering. The most in-demand certification is an IT Infrastructure Library (ITIL) Certification.
- **Education** — An associate degree is typically required for computer network support specialists. A bachelor's degree is typically required for computer programmers and web developers.
- **Supply** — Analysis of postsecondary completions shows that on average 16 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 52 trained workers in the subregion and 142 workers in the region. The Center of Excellence recommends that Merced College work with the regional directors, the college's advisory board, and local industry in the development of programs to address the shortage of Computer Programming workers in the region.

Introduction

The Central Valley/Mother Lode Center of Excellence was asked by Merced College to provide labor market information for Computer Programming. The geographical focus for this report is the North Central Valley/Northern Mother Lode (NCV/NML) subregion, but regional demand and supply data has been included for broader applicability and use. The average living wage for a single adult in the NCV/NML subregion is \$12.65/hour.¹ Analysis of the program and occupational data related to Computer Programming 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
- 15-1251, Computer Programmers
- 15-1254, Web Developers

The occupational titles, job descriptions, sample job titles, 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, Telecommunications, Customer and Personal Service, English Language

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

Computer Programmers

Job Description: Create, modify, and test the code and scripts that allow computer applications to run. Work from specifications drawn up by software and web developers or other individuals. May develop and write computer programs to store, locate, and retrieve specific documents, data, and information.

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

Skills: Programming, Active Listening, Complex Problem Solving, Critical Thinking, Quality Control Analysis

Web Developers

Job Description: Develop and implement websites, web applications, application databases, and interactive web interfaces. Evaluate code to ensure that it is properly structured, meets industry standards, and is compatible with browsers and devices. Optimize website performance, scalability, and server-side code and processes. May develop website infrastructure and integrate websites with other computer applications.

Knowledge: Computer and Electronics, English Language, Mathematics, Communications and Media

Skills: Programming, Critical Thinking, Complex Problem Solving, Operations Analysis, Reading Comprehension

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

Occupational Demand

The NCV/NML subregion employed 770 workers in Computer Programming occupations in 2020 (Exhibit 1). The largest occupation is computer network support specialists with 364 workers in 2020. This occupation is projected to grow by 4% over the next five years and has the greatest number of projected annual openings, 30.

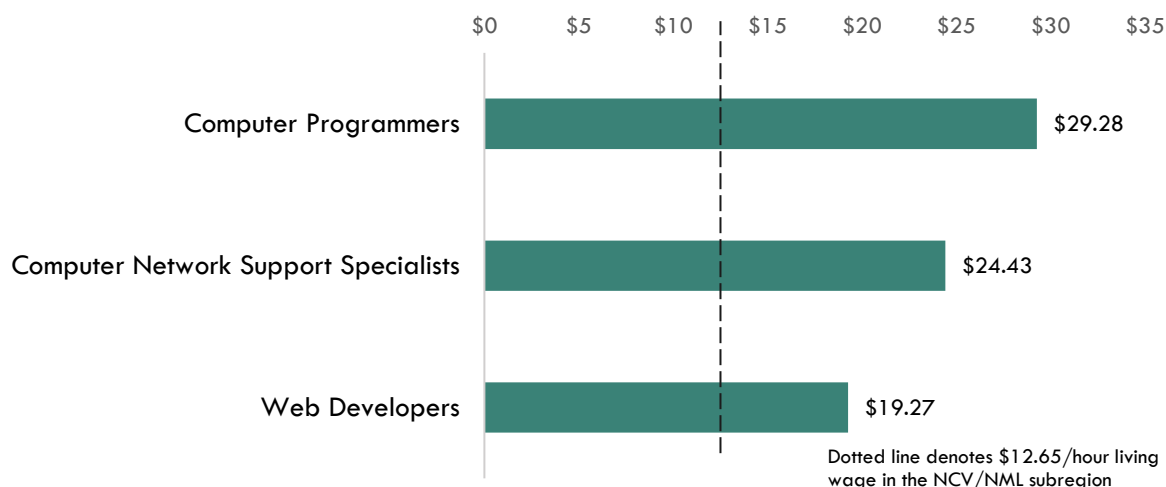
Exhibit 1. Computer Programming employment and occupational projections in the NCV/NML subregion

Occupation	2020 Jobs	2025 Jobs	5-Year Change	5-Year % Change	Annual Openings
Computer Network Support Specialists	364	380	16	4%	30
Computer Programmers	259	246	(13)	(5%)	17
Web Developers	147	159	12	8%	13
TOTAL	770	785	15	2%	61

Wages

Exhibit 2 shows the entry-level hourly wages of the Computer Programming occupations. Computer programmers earn the highest entry-level wage, \$29.28/hour in the subregion².

Exhibit 2. Computer Programming entry-level wages in the NCV/NML subregion



Job Postings

There were 274 job postings for the three occupations in the NCV/NML subregion from February 2022 to July 2022.³ The employers with the most job postings are listed in Exhibit 3.

² Entry-level wages are derived from the 25th percentile.

³ 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 3. Top employers of Computer Programming by number of job postings

Employer	Job Postings	% Job Postings
Anthem Blue Cross	14	9%
Centene Corporation	14	9%
T Mobile USA Incorporated	6	4%
Wireless Vision	6	4%
Foster Farms	4	3%
VW Services Incorporated	4	3%
DHL Express	3	2%
Epathusa	3	2%
Merced County	3	2%
Mikes Mobile Services	3	2%

Exhibit 4 shows how job postings for the targeted occupations in the NCV/NML subregion are distributed across three O*NET OnLine occupations. The occupational title Web Developers is listed in 145 job postings. Note how this occupational title dominates the job posting results. Common job titles in postings include Backend Engineer - Remote Optional in 31 job postings, Front End Engineer - Remote Optional in 30 job postings, and Mobile Expert in 17 job postings.

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

Occupational Title	Job Postings	% of Job Postings
Web Developers	145	53%
Computer Programmers	103	38%
Computer Network Support Specialists	26	9%

Salaries

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

Exhibit 5. Salaries for Computer Programming occupations

Market Salary Percentile	Salary Amount
10th Percentile	\$32,672
25th Percentile	\$52,452
50th Percentile	\$81,244
75th Percentile	\$119,215
90th Percentile	\$200,550

Education

Of the 274 job postings, 205 listed an education level preferred for the positions being filled. Among those, 76% requested a bachelor’s degree, 28% requested high school or vocational training, and 6% 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%.

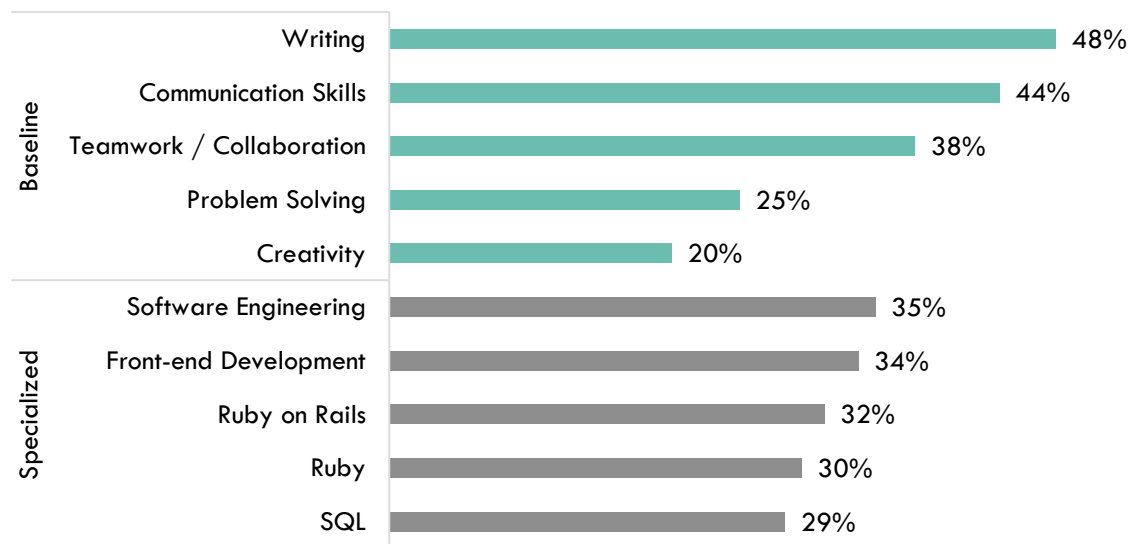
Exhibit 6. Education levels requested in job postings for Computer Programming

Education Level	Job Postings	% of Job Postings
Bachelor's degree	155	76%
High school or vocational training	57	28%
Associate's degree	13	6%
Master's degree	11	5%
Doctoral degree	5	2%

Baseline and Specialized Skills

Exhibit 7 depicts the top baseline and specialized skills for the targeted occupations. The three most important baseline skills are writing, 48% of job postings, communication skills, 44%, and teamwork/collaboration, 38%. The top three specialized skills are software engineering, 35% of job postings, front-end development, 34%, and Ruby on Rails, 32%.

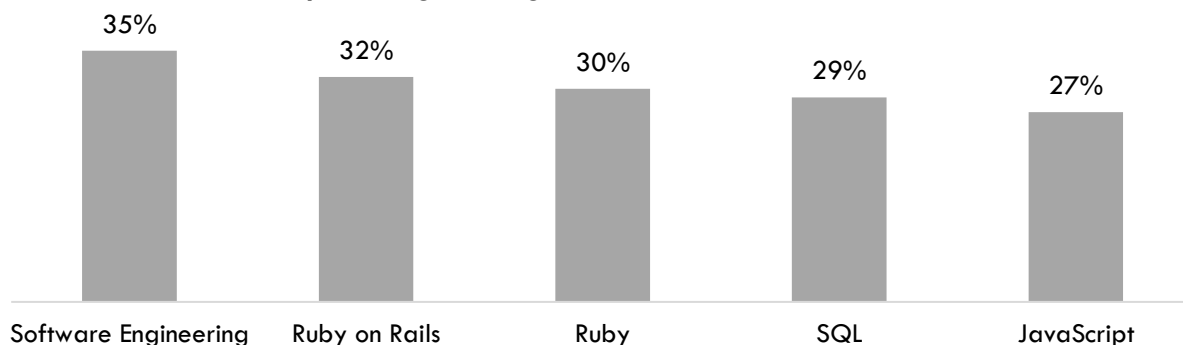
Exhibit 7. In-demand Computer Programming baseline and specialized skills



Software Skills

Analysis also included the software skills most in demand by employers. Software engineering and Ruby on Rails were the top two software skills identified in job postings (Exhibit 8).

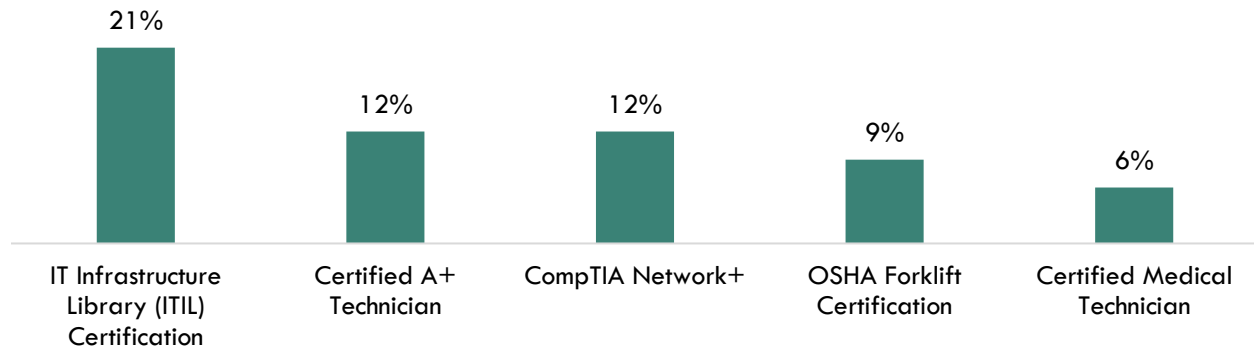
Exhibit 8. In-demand Computer Programming software skills



Certifications

Of the 274 job postings, 34 contained certification data. Among those, 21% indicated a need for a IT Infrastructure Library (ITIL) Certification. The next top certifications are certified A+ technician and COmpTIA Network+ (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 Programming certifications requested in job postings



Education, Work Experience & Training

An associate degree is typically required for computer network support specialists. A bachelor's degree is typically required for computer programmers and web developers (Exhibit 10).

Exhibit 10. Education, work experience, training, and Current Population Survey results for Computer Programming occupations⁴

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Computer Network Support Specialists	Associate's degree	None	None	39.2%
Computer Programmers	Bachelor's degree	None	None	20.4%
Web Developers	Bachelor's degree	None	None	23.4%

⁴ "Labor Force Statistics from the Current Population Survey," Bureau of Labor Statistics, <https://www.bls.gov/cps/>.

Supply

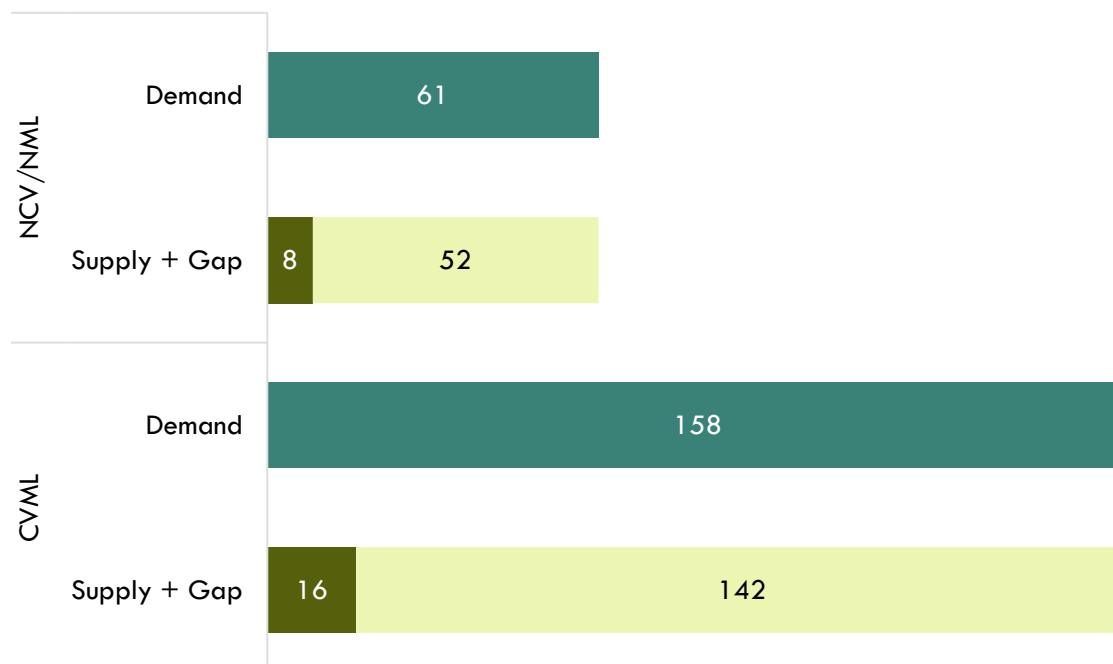
Analysis of program data from the Integrated Postsecondary Education Data System (IPEDS) included the TOP code and title: 070710 - Computer Programming. Analysis of the last three years of data shows that, on average, 16 awards were conferred in the Central Valley/Mother Lode region each year (Exhibit 11).

Exhibit 11. Postsecondary supply for Computer Programming occupations in the region

TOP/CIP Code- Title	College	Associate Degree	Certificate 12 < 18 Semester Units	Certificate 16 < 30 Semester Units	Certificate 18 < 30 Semester Units	Certificate 30 < 60 Semester Units	Certificate 8 < 16 Semester Units	Subtotal
070710 - Computer Programming	Columbia	1						1
	Modesto		7				0	8
	Reedley College	1		4	0			5
	San Joaquin Delta				0	0		1
	West Hills Lemoore					2		2
TOTAL		2	7	4	3	0	0	16

There is an undersupply of 52 Computer Programming workers in the NCV/NML subregion and 142 workers in the region (Exhibit 12).

Exhibit 12. Computer Programming workforce demand (annual job openings), postsecondary supply of students (awards), and additional students needed to fill gap in the NCV/NML subregion and region



Student Outcomes

Exhibit 13 summarizes employment and wage outcomes from the California Community College Chancellor’s Cal-PASS Plus LaunchBoard for the TOP code related to Computer Programming. Of note, 12 students received a degree or certificate or attained apprenticeship journey status; 121 students transferred; 67% of students obtained a job closely related to their field of study; 38% had a median change in earnings; and 60% of students attained a living wage.

Exhibit 13. Regional metrics for the TOP code related to Computer Programming

Metric	Computer Programming 070710
Students Who Got a Degree or Certificate or Attained Apprenticeship Journey Status	12
Number of Students Who Transferred	121
Job Closely Related to Field of Study	67%
Median Change in Earnings	38%
Attained a Living Wage	60%
* denotes data not available.	

Conclusion

The entry-level wages of the three occupations exceed the NCV/NML subregion’s average living wage. There were 274 job postings in the past six months for occupations related to Computer Programming in the subregion. Analysis of skills and certification requirements in job postings indicates:

- The top baseline skill is writing, and the top specialized skill is software engineering.
- The top software skill is software engineering.
- The top certification is an IT Infrastructure Library (ITIL) Certification.

There is an undersupply of trained workers, a shortage of 52 in the NCV/NML subregion and 142 in the region.

Recommendation

Based on these findings, it is recommended that Merced College work with the regional director, the college’s advisory board, and local industry in the development of programs to address the shortage of Computer Programming 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: economicmodeling.com .
Typical Education Level and On-the-job Training	Bureau of Labor Statistics (BLS) uses a system to assign categories for entry-level education and typical on-the-job training to each occupation for which BLS publishes projections data: https://www.bls.gov/emp/tables/educational-attainment.htm .
Labor Force, Employment and Unemployment Estimates	California Employment Development Department, Labor Market Information Division: labormarketinfo.edd.ca.gov .
Job Posting and Skills Data	Burning Glass: burning-glass.com/ .
Additional Education Requirements/ Employer Preferences	The O*NET Job Zone database includes over 900 occupations as well as information on skills, abilities, knowledge, work activities and interests associated with specific occupations: onetonline.org .

Key Terms and Concepts

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

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

Employment Estimate: The total number of workers currently employed.

Employment Projections: Projections of employment are calculated by a proprietary Economic Modeling Specialists, Intl. (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.