

September 2021

Labor Market Analysis

Geographic Information Systems (GIS)

POWERED BY



California
Community
Colleges



C·O·E

CENTERS OF EXCELLENCE
Inform Connect Advance



Prepared by the Central Valley/Mother Lode Center of Excellence

Table of Contents

- Summary 2
 - Key Findings: 2
- Introduction 3
- Occupational Demand 4
- Wages 4
- Job Postings 5
 - Salaries..... 5
 - Education 6
 - Baseline and Specialized Skills 6
 - Software Skills..... 7
 - Certifications..... 7
- Education, Work Experience & Training 7
- Supply 8
- Student Outcomes 9
- Conclusion 9
- Recommendation 9
- Appendix A: Methodology & Data Sources 10

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.

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 geographic information systems (GIS). Five occupations related to geographic information systems were identified for Merced College:

- 15-1299, Computer Occupations, All Other
- 19-4099, Life, Physical, and Social Science Technicians, All Other
- 19-4011, Agricultural and Food Science Technicians
- 19-2041, Environmental Scientists and Specialists, Including Health
- 45-4011, Forest and Conservation Workers

Key Findings:

- **Occupational demand** — More than 2,500 workers were employed in jobs related to geographic information systems in 2020 in the North Central Valley/Northern Mother Lode (NCV/NML) subregion. The largest occupation is environmental scientists and specialists, including health, with 785 workers in 2020, a projected growth rate of 8% over the next five years, and 84 annual openings.
- **Wages** — Computer occupations, all other, earn the highest entry-level wage, \$22.85/hour in the subregion. Please note the entry-level wage for forest and conservation technicians falls below the subregion's living wage.
- **Employers** — Employers with the most job postings in the subregion are Anthem Blue Cross, The Save Mart Companies, and Amazon.
- **Occupational titles** — The most common occupational title in job postings in the subregion is quality control analysts. The most common job title is quality assurance technician.
- **Skills and certifications** — The top baseline skill is communication, the top specialized skill is quality assurance and control, and the top software skill is Microsoft Excel. The most in-demand certification is a driver's license.
- **Education** — A high school diploma or equivalent is typically required for forest and conservation workers, and an associate degree is typically required for agricultural and food science technicians, and life, physical, and social science technicians.
- **Supply** — Analysis of postsecondary completions in the region shows that on average 177 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 248 trained workers in the subregion and 491 workers in the region. The Center of Excellence recommends that Merced College work with the regional director, the college's advisory board, and local industry in the expansion or development of programs to address the shortage of geographic information systems workers in the region.

Introduction

The Central Valley/Mother Lode Center of Excellence was asked by Merced College to provide labor market information for geographic information systems. 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 /hour.¹ Analysis of the program and occupational data related to geographic information systems resulted in the identification of applicable occupations. The Standard Occupational Classification (SOC) System codes and titles used in this report are:

- 15-1299, Computer Occupations, All Other
- 19-4099, Life, Physical, and Social Science Technicians, All Other
- 19-4011, Agricultural and Food Science Technicians
- 19-2041, Environmental Scientists and Specialists, Including Health
- 45-4011, Forest and Conservation Workers

The occupational titles, job descriptions, and knowledge and skills from the Bureau of Labor Statistics and O*NET OnLine are shown below. O*NET data was not available for computer occupations, all other; life, physical, and social science technicians, all other; and agricultural and food science technicians.

Environmental Scientists and Specialists, Including Health

Job Description: Conduct research or perform investigation for the purpose of identifying, abating, or eliminating sources of pollutants or hazards that affect either the environment or public health. Using knowledge of various scientific disciplines, may collect, synthesize, study, report, and recommend action based on data derived from measurements or observations of air, food, soil, water, and other sources.

Knowledge: English Language, Mathematics, Mechanical, Law and Government, Clerical, Biology

Skills: Active Listening, Critical Thinking, Reading Comprehension, Science, Speaking

Forest and Conservation Workers

Job Description: Under supervision, perform manual labor necessary to develop, maintain, or protect areas such as forests, forested areas, woodlands, wetlands, and rangelands through such activities as raising and transporting seedlings; combating insects, pests, and diseases harmful to plant life; and building structures to control water, erosion, and leaching of soil. Includes forester aides, seedling pullers, tree planters, and gatherers of nontimber forestry products such as pine straw.

Knowledge: Geography, English Language, Public Safety and Security, Clerical, Biology

Skills: Coordination, Speaking, Active Listening, Critical Thinking, Judgement and Decision Making

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://insightcced.org/tools-metrics/self-sufficiency-standard-tool-for-california/>.

Occupational Demand

The North Central Valley/Northern Mother Lode subregion employed 2,562 workers in geographic information systems occupations in 2020 (Exhibit 1). The largest occupation is environmental scientists and specialists, including health, with 785 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, 84.

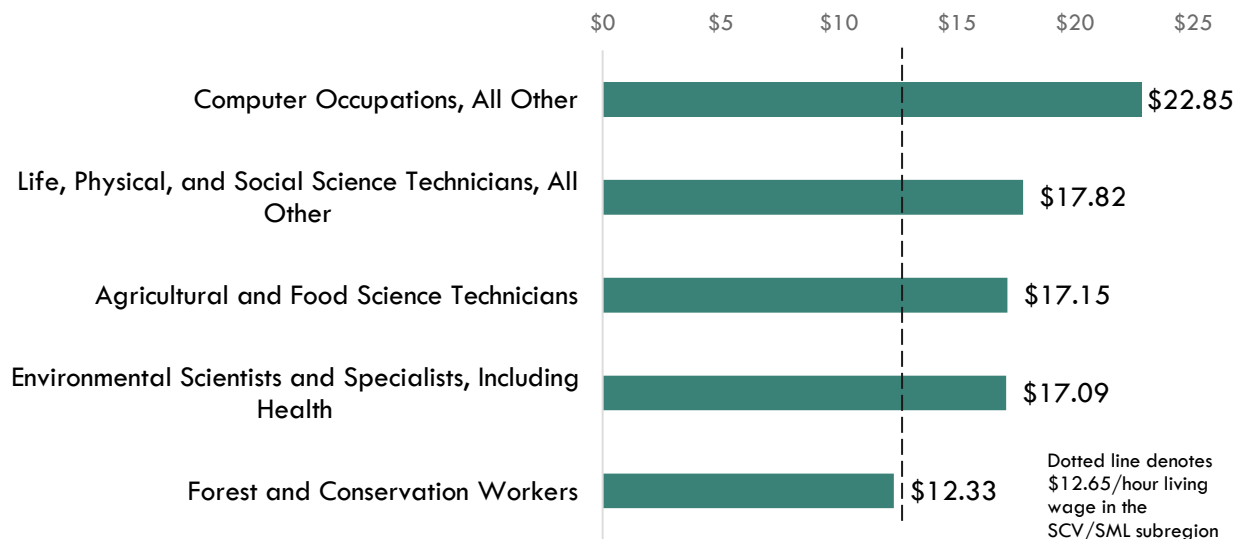
Exhibit 1. GIS employment and occupational projections in the NCV/NML subregion

Occupation	2020 Jobs	2025 Jobs	5-Year Change	5-Year % Change	Annual Openings
Environmental Scientists and Specialists, Including Health	785	851	66	8%	84
Agricultural and Food Science Technicians	664	665	1	0%	75
Computer Occupations, All Other	763	806	42	6%	61
Forest and Conservation Workers	221	242	21	10%	37
Life, Physical, and Social Science Technicians, All Other	129	138	10	7%	17
TOTAL	2,562	2,702	140	5%	275

Wages

Exhibit 2 shows the entry-level hourly wages of the geographic information systems occupations. Computer occupations, all other, earn the highest entry-level wage, \$22.85/hour in the subregion. Entry-level wages are derived from the 25th percentile. Please note the entry-level wage for forest and conservation technicians falls below the subregion’s living wage.

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



Job Postings

There were 1,362 job postings for the five occupations in the NCV/NML subregion from March 2021 to August 2021.² The employers with the most job postings are listed in Exhibit 3.

Exhibit 3. Top employers of GIS workers by number of job postings

Employer	Job Postings	% Job Postings
Anthem Blue Cross	132	13%
The Save Mart Companies	56	5%
Amazon	36	3%
Danaher Corporation	25	2%
Ej Gallo Winery	19	2%
Ej Gallo	17	2%
Cepheid	14	1%
Community Medical Centers Incorporated	12	1%
Gallo Glass Company	10	1%
Human Bees	10	1%

Exhibit 4 shows how job postings for the targeted occupations in the NCV/NML subregion are distributed across 10 O*NET OnLine occupations. The occupational title quality control analysts is listed in 325 job postings. Note how this occupational title dominates the job posting results. Common job titles in postings include Quality Assurance Technician in 63 job postings, Quality Control Technician in 61 job postings, and In-Home Usage Tester in 26 job postings.

Exhibit 4. Top occupational titles in job postings for GIS occupations

Occupational Title	Job Postings	% of Job Postings
Quality Control Analysts	325	24%
Information Technology Project Managers	259	19%
Business Intelligence Analysts	216	16%
Computer Systems Engineers/Architects	123	9%
Software Quality Assurance Engineers and Testers	97	7%
Document Management Specialists	92	7%
Database Architects	40	3%
Agricultural Technicians	27	2%
Video Game Designers	25	2%
Data Warehousing Specialists	24	2%

Salaries

Exhibit 5 shows the “Market Salaries” for geographic information systems 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.

² 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 GIS occupations

Market Salary Percentile	Salary Amount
10th Percentile	\$30,662
25th Percentile	\$36,808
50th Percentile	\$56,445
75th Percentile	\$86,268
90th Percentile	\$106,709

Education

Of the 1,362 job postings, 986 listed an education level preferred for the positions being filled. Of those, 63% requested a bachelor's degree, 47% requested high school or vocational training, and 16% 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%.

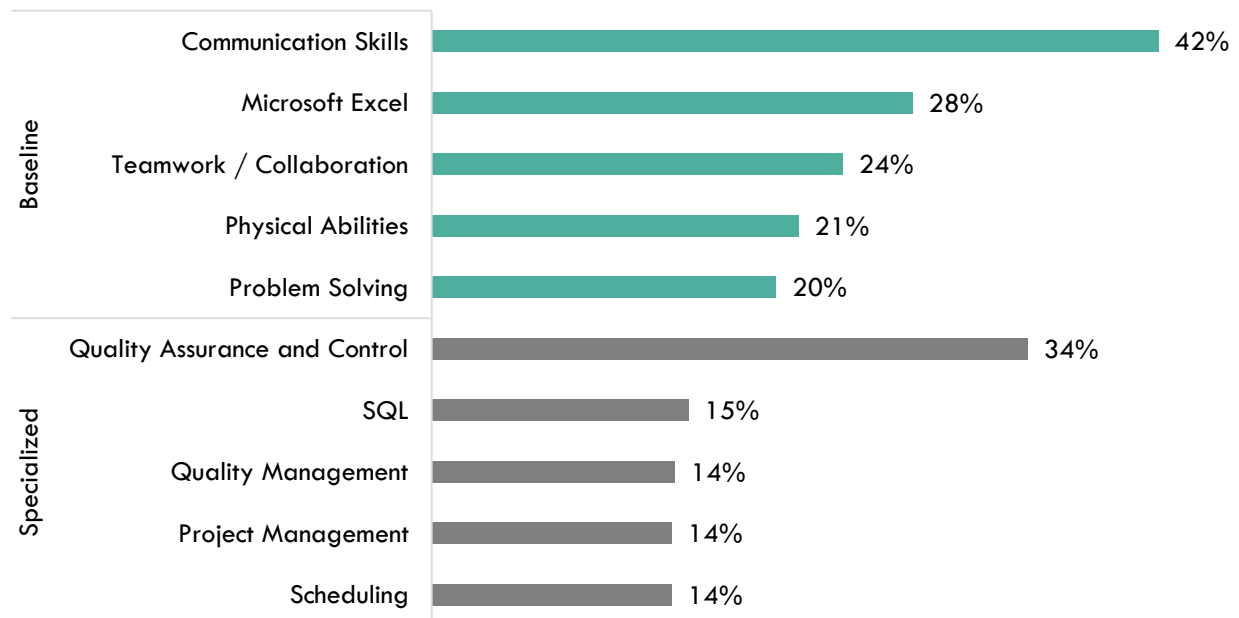
Exhibit 6. Education levels requested in job postings for GIS occupations

Education Level	Job Postings	% of Job Postings
Bachelor's degree	622	63%
High school or vocational training	465	47%
Master's degree	157	16%
Associate degree	147	15%
Doctoral degree	38	4%

Baseline and Specialized Skills

Exhibit 7 depicts the top baseline and specialized skills for the targeted occupations. The three most important baseline skills are communication, 42% of job postings, Microsoft Excel, 28%, and teamwork/collaboration, 24%. The top three specialized skills are quality assurance and control, 34% of job postings, SQL, 15%, and quality management, 14%.

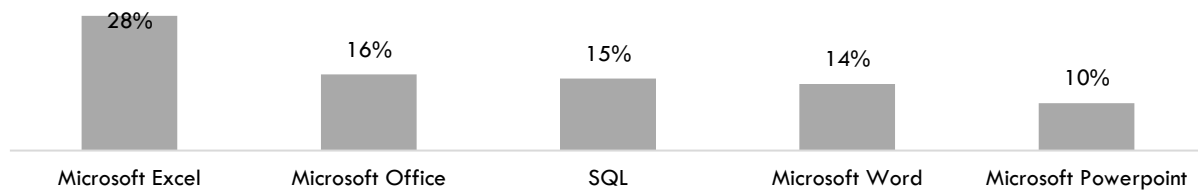
Exhibit 7. In-demand GIS baseline and specialized skills



Software Skills

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

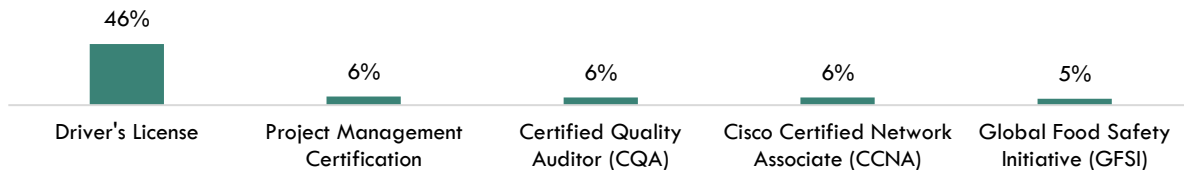
Exhibit 8. In-demand GIS software skills



Certifications

Of the 1,362 job postings, 311 contained certification data. Among those, 46% indicated a need for a driver's license. The next top certifications are project management and Certified Quality Auditor (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 GIS requested in job postings



Education, Work Experience & Training

A high school diploma or equivalent is typically required for forest and conservation workers, and an associate degree is typically required for agricultural and food science technicians, and life, physical, and social science technicians (Exhibit 10). A bachelor's degree is typically required for the remaining two occupations. Please note that 0% of environmental scientists and specialists, including health, hold less than a bachelor's degree, according to CPS data.

Exhibit 10. Education, work experience, training, and Current Population Survey results for GIS occupations³

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Computer Occupations, All Other	Bachelor's degree	None	Moderate-term	27.2%
Environmental Scientists and Specialists, Including Health	Bachelor's degree	None	None	0.0%
Agricultural and Food Science Technicians	Associate degree	None	Moderate-term	40.5%
Life, Physical, and Social Science Technicians, All Other	Associate degree	None	None	36.6%
Forest and Conservation Workers	High school diploma or equivalent	None	Moderate-term on-the-job training	40.5%

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

Supply

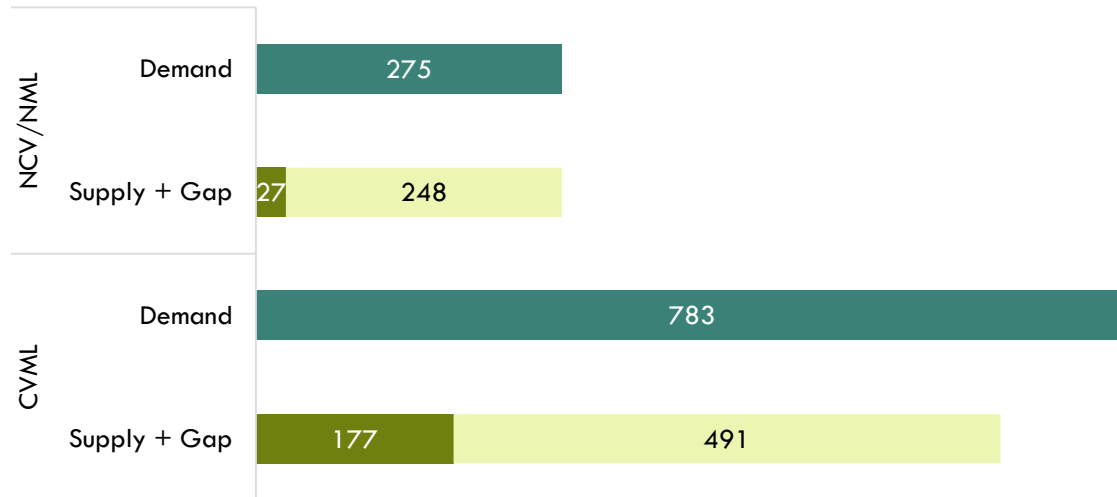
Analysis of program data from the California Community Colleges Chancellor’s Office Data Mart included the TOP and CIP codes and titles: 01.0102 - Agribusiness/Agricultural Business Operations, 010100 - Agriculture Technology and Sciences, General, and 220610 - Geographic Information Systems. Analysis of the last three years of data shows that, on average, 177 awards were conferred in the Central Valley/Mother Lode region each year (Exhibit 11). Data was not available for TOP 030300 - Environmental Technology.

Exhibit 11. Postsecondary supply for GIS occupations in the region

TOP/CIP Code-Title	College	Associate Degree	Bachelor's Degree	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	Credit Award < 6 Semester Units	Subtotal
01.0102 - Agribusiness/Agricultural Business Operations	California State University-Bakersfield		6							6
	California State University-Fresno		128							128
010100 - Agriculture Technology and Sciences, General	Merced	9								9
	Modesto	6						0		6
	Porterville	9								9
	Reedley College	1			1					2
	West Hills Coalinga	2				1		1		4
220610 - Geographic Information Systems	Columbia	2		0	0		8		2	12
TOTAL		29	134	0	3	0	9	0	2	177

There is an undersupply of 248 GIS workers in the NCV/NML subregion and 491 workers in the region (Exhibit 12).

Exhibit 12. GIS workforce annual demand and supply in the NCV/NML subregion and region



Student Outcomes

Data was not available from the California Community College Chancellor’s Cal-PASS Plus LaunchBoard for the TOP codes related to geographic information systems.

Conclusion

The entry-level wages of four of the five occupations exceed the NCV/NML subregion’s average living wage. Please note the entry-level wage for forest and conservation technicians falls below the subregion’s living wage. There were 1,362 job postings in the past six months for occupations related to geographic information systems in the subregion. Analysis of skills and certification requirements in job postings indicates:

- The top baseline skill is communication, and the top specialized skill is quality assurance and control.
- The top software skill is Microsoft Excel.
- The top certification is a driver’s license.

There is an undersupply of trained workers, a shortage of 248 in the NCV/NML subregion and 491 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 expansion of programs to address the shortage of geographic information systems 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.