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## Chapter 17 VALE Calculations

Every time VALE is used, the program scans 12,739 job titles. Each of the job titles from the DOT is cross-referenced by the worker characteristics needed to satisfactorily perform work in the occupation. The U.S. Department of Labor, Employment and Training Administration, assigns these characteristics. Each of these job titles is cross-walked to one of 501 Census Code categories by the National Crosswalk Service Center, which is an agent of the National Occupational Information Coordinating Committee. Furthermore, each Census Code category is clustered within one of six broad occupational groups.

### Scanning the DOT

Assume that you wish to perform a VALE run search of all occupations requiring an average level of general learning ability (General Learning Ability at level 3, the middle one-third of the general population). The first thing VALE examines is the G-aptitude of each of the DOTs contained in the first three-digit Census Code category. Assume that VALE finds ten of these job titles in the first three-digit Census Code category. VALE will inspect each of these ten job titles to see how many are defined by the Department of Labor as requiring a G-aptitude of 3. If four of these ten job titles require a G-aptitude of 3, VALE estimates a person with an average level of general learning ability will be able to satisfactorily perform work in forty percent (four out of every ten) of all jobs available in the first Census Code category.

At this point, VALE will find the number of people employed in jobs classified under the first Census Code category. Let us assume that 100 people are employed in the local labor market within the first Census Code category. Since VALE estimated that 40 percent of the people employed in this Census Code Category are performing work requiring a G-aptitude of 3, it will report that 40 of these 100 employed people have jobs requiring an average level of general learning ability. It also estimates that all of the 40 selected workers earn the average earnings for all workers in the first Census Code. Once VALE has estimated labor market access and earnings within the first Census Code category, it will repeat this process for the remaining 500 Census Code categories.

### Compilation of Results

When all 12,739 job titles have been processed by Census Code category, VALE begins the task of compiling its findings. VALE now focuses on the six broad occupational groups. All Census Code categories cross-referenced to the first broad occupational group are identified. The 40 employed persons selected in the above example are added

to the selection results of the other Census Code categories within the first broad occupational group. The process is repeated for the remaining five groups. The six results are then reported in a summary table. This table reports the total number of workers employed, the percent employed, the number of workers selected, and the percent selected in each of the six broad occupational groups for the relevant labor market.

VALE can report either median or mean earnings. Let us begin by examining how VALE computes median earnings. Assume that only the following small sample was selected from a national run:

<u>Census Code Category Number</u>	<u>Selected Number of Employed Persons</u>	<u>Census Code Category Median Annual Earnings</u>
205	16,653	\$19,517
206	9,267	\$29,208
207	245,091	\$22,634
208	145,457	\$22,552

When sorted in ascending order by median annual earnings, the following data are obtained:

<u>Census Code Category Number</u>	<u>Selected Number of Employed Persons</u>	<u>Census Code Category Median Annual Earnings</u>
205	16,653	\$19,517
208	145,457	\$22,552
207	245,091	\$22,634
206	9,267	\$29,208
	416,468	

VALE then determines the midpoint of all selected employed persons ( $\{416,468 \text{ divided by } 2\} + 1 = 208,235^1$ ) and proceeds to determine the Census Code category which contains the midpoint worker once earnings are sorted from smallest to largest. This is the first Census Code category of the sorted data where the cumulative frequency (total

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<sup>1</sup> To determine the “midpoint worker,” VALE first takes the total selected number of employed persons and divides it by two. It then takes this number and adds one to it. The first integer greater than or equal to this result is the “midpoint worker.” Therefore, if the total selected number of employed persons is an even number, like 416468, then the midpoint worker is one more than half of 416468 or 208235. If the total number selected happened to be an odd number, like 416467, then half of this number plus one equals 208234.5. VALE will go to the next largest integer, 208235, and consider that worker the midpoint worker.

number of selected persons in a Census Code category or previous Census Code category) equals or exceeds 208,235.

Using the example above, the highest Census Code category of the rank-ordered data contains 9,267 people. Since there are no previous categories before this one, the cumulative frequency for Census Code category 206 is simply 9,267. This cumulative frequency is less than 208,235 so it is not the Census Code category containing the midpoint worker. The second highest rank-ordered Census Code category has 245,091 employed persons. The cumulative frequency for this category is the total number of people in the first two categories combined which is  $9,267 + 245,091 = 254,358$ . This cumulative frequency does exceed 208,235 indicating that the midpoint worker is somewhere in Census Code category 207. In this case VALE would report annual median earnings of \$22,634. This median level of annual earnings would be for all people in the United States working at jobs requiring an average degree of general learning ability.

Now let us assume that you are interested in mean annual earnings instead of median annual earnings. Assume that only the following small sample was selected from a national run:

<u>Census Code Category Number</u>	<u>Selected Number of Employed Persons</u>	<u>Census Code Category Mean Weekly Earnings</u>
205	16,653	\$19,517
206	9,267	\$29,208
207	245,091	\$22,634
208	<u>145,457</u>	\$22,552
	416,468	

Computing mean annual earnings does not require sorting of the data. However, one cannot simply add the four numbers in the Census Code Category Mean Weekly Earnings column together and divide by four to get mean annual earnings. This would be incorrect because this calculation would give equal weight to the mean earnings in each of the four Census Code categories. Clearly a larger percentage of people perform work in Census Code category 207 than Census Code category 206.

In this situation, VALE computes a weighted average (WA). A simple way to compute this weighted average is to sum together the total earnings of people in each of the four Census Code categories and divide by the total number of selected employed persons. In the example above, the total amount of earnings for the selected people working in Census code category 205 is simply the average earnings for that occupational category multiplied by the selected number of workers in that occupational category. In this example, that would be  $\$19,517 * 16,653$  or \$325,016,601. If we do this for the remaining three Census Code categories, add the four figures together, and divide by the total number of selected employed persons, we will have calculated the weighted average. In this example, the weighted average is:

$$\begin{aligned} \text{WA} &= ( (\$19,517 * 16,653) + (\$29,208 * 9,267) + (\$22,634 * 245,091) + \\ &\quad (\$22,552 * 145,457) ) / 416,468 \\ &= \$22,627 \end{aligned}$$

This mean level of annual earnings would be for all people in the United States working at jobs requiring an average degree of general learning ability.