

Are Immigrants Underskilled, or Are Their Jobs Underskilled?

By
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Introduction

There are many reasons to be concerned about whether U.S. workers have appropriate levels of skill and education, and whether they are able to fully employ the training and knowledge that they have. The U.S. economy is constantly evolving, and the sets of skills and education that once served workers and employers are in a state of flux as new industries, technologies, methods and markets develop. Planners of decades past could hardly have foreseen, for example, the rise of the digital era. Even apart from the growing influence of information technology, workers in many industrial sectors including service, manufacturing, education and health and social services are expected to perform and accomplish tasks that were not conceived of just a few decades ago.

An examination of whether American workers have appropriate skills must account for a key demographic feature of this country: the presence of large numbers of foreign-born workers. The United States is home to about 40 million immigrants, about 27.2 million of whom were in the labor force in 2014, and who constituted 17 percent of all U.S. workers in that year. This immigrant labor force is increasingly import. Between 2015 and 2035, the U.S. workforce would decline by 18 million persons in the absence of immigration.¹ In other words,

immigrants in the coming years will not just add to the labor force, they will make it grow because the native-born worker population is in decline.

Many immigrants are low-skill workers, as will be described in this paper. This makes them potential candidates for efforts to improve workers' economic security and productivity by providing them with additional training and education.

Analysts have argued for "upskilling" or raising the skill and education level of workers in the U.S. Carnevale et al. point out that 99 percent of new jobs created since the 2010 recession have gone to workers with at least some college education,ⁱⁱ which implies that low-skill workers are faring quite badly in getting new jobs. They write that "The economy is seeing a continuing scouring out of low-skill jobs in favor of high-skill jobs" and this "makes the acquisition of postsecondary education an essential prerequisite to participate in the 21st century labor market."ⁱⁱⁱ

Research by The National Skills Coalition makes the case that there are opportunities for those low-skill workers who increase their skills and education.^{iv} Using the example of Texas, the Coalition argues that "More than half of all jobs in Texas (56 percent) are middle-skill occupations that require more than a high school diploma, but not a four-year degree. Yet only 42 percent of Texas workers have been educated to the middle-skill level."

But there is evidence that contradicts some of the hopefulness behind the idea of upskilling workers to get them better jobs and improve their earnings. Writing in the *Monthly Labor Review*, Ann Norris of the U.S. Bureau of Labor Statistics describes an ongoing decline in the number of mid-level jobs and the salaries they pay, writing that "Data show that wages and

employment for mid-level jobs declined over the last 25 years, while wages for workers at the bottom and top of the wage distribution have increased.”^v According to Norris, “The overall employment share of middle-wage jobs decreased from 39.1 percent in 2000 to 36.6 percent in 2013.”^{vi} These facts would suggest that upskilling workers may not lead them to better paying jobs, and that there are limits to the opportunities available to lower-skill workers. This presumably would include immigrant workers.

In light of the large number of immigrant workers in the U.S. economy, and the debate over worker skills and the possibility of upskilling, more understanding is needed of the roles played by immigrant workers in the labor force. Specifically, information that addresses the skills of immigrant workers on the one hand and the skills demanded by employers on the other hand, would illuminate the extent to which upskilling makes sense in the case of immigrants, and how immigrants may have a particular role within any debate on workforce upskilling. This would help us understand how all workers abilities and opportunities are developing in the future of work.

Immigrants in the U.S. Labor Force

Immigrants are a substantial portion of the U.S. workforce

The overall U.S. labor force in 2014 included nearly 161 million persons, as seen in Table 1. Of these, 58.7 million or nearly half were aged 16-34. The foreign born are almost 17 percent of the entire workforce and 14 percent of workers aged 16-34, exceeding the size of Black non-Latino and Latino native-born populations.

The population of workers aged 16-34 is of special interest because in many ways they are the future of the workforce. Members of this group have at least another thirty years of work ahead of them, and this group would be a candidate for upskilling because they have time left to reap the benefits of enhanced skills. For these reasons, tables and discussion in this chapter include breakouts specifically for workers aged 16-34.

Foreign-born workers have many different legal statuses and conditions related to how they entered the U.S. Some of the various, overlapping categories include naturalized citizen, refugee, undocumented immigrant, legal permanent resident, or a holder of Deferred Action for Childhood Arrivals (DACA) status. This report is limited to the two types of categories found in the American Community Survey: naturalized immigrants and noncitizens.

The naturalized immigrants in the labor force are legal immigrants who have completed the process of becoming a U.S. citizen and thereby obtaining nearly all the rights and privileges of native-born persons. Most immigrants who naturalize have lived in the U.S. for at least five years, have demonstrated that they can speak English, and have obtained sufficient education

and knowledge to pass a test on U.S. civics and history. Many immigrants take more than five years to finally naturalize, and being a naturalized citizen therefore implies a certain amount of integration in U.S. society. Naturalized citizens have access to jobs, especially in the public sector, that require U.S. citizenship.

The noncitizen immigrants include both legal permanent residents, undocumented immigrants, and persons with special statuses. Many legal permanent residents have been authorized to reside in the U.S. because they have a family member in this country who was able to sponsor their admission. Some others were allowed to enter, live and work in the U.S. explicitly because of their skills and/or willingness to work in certain occupations or industries. These include high-skill immigrants with specialized skills that are in short supply here, such as physicians and information technology workers. Undocumented or unauthorized immigrants in the labor force either entered the U.S. illegally or entered legally but remained here past the terms of their temporary visa. By definition, these persons cannot legally work in the U.S. Persons with special statuses include immigrants who have been allowed to live in the U.S. under Deferred Action for Childhood Arrivals, Temporary Protected Status, or other special statuses.

Table 1
Distribution of U.S. Labor Force by Race, Ethnicity, Nativity and Age: 2014

	Total Labor Force	Ages 16-34 in Labor Force
Total	160,998,942	58,723,248
Total	100%	100%
Native Born White Non-Latino	60.9%	56.3%
Native Born Black Non-Latino	10.3%	11.9%
Native Born Asian Non-Latino	1.3%	2.2%
Native Born Latino	8.4%	13.0%
Native Born Other Non-Latino	2.1%	3.0%
Foreign Born Naturalized	7.9%	4.2%
Foreign Born Noncitizen	9.0%	9.3%

Source: 2014 American Community Survey

Immigrants have relatively high labor force participation and higher-than-average employment rates

Immigrants are important to discussions of the U.S. labor force because not only are they a large portion of all workers but because, as a group, they have high rates of engagement with work. Naturalized immigrants have a high labor force participation of 76 percent compared to the national average of 71 percent for persons aged 16-34, as seen in Table 2. The labor force participation rate of noncitizens, 68 percent, exceeds that of native-born Blacks, Latinos and Asians.

Both naturalized immigrants and noncitizens exceed the national employment rate once they are in the labor force. Compared to the overall employment rate of almost 90 percent for

the entire population aged 16-34, the corresponding level is 93 percent for naturalized immigrants and 92 percent for noncitizens.

Table 2
Labor Force Participation and Employment by Race, Ethnicity and Nativity for Persons Aged 16-34: U.S., 2014

	Pct. in Labor Force	Pct. of Labor Force Employed
Total	70.6%	89.5%
Native Born White Non-Latino	73.5%	91.5%
Native Born Black Non-Latino	66.3%	80.3%
Native Born Asian Non-Latino	63.5%	91.4%
Native Born Other Non-Latino	66.3%	85.0%
Native Born Latino	66.0%	87.1%
Foreign Born Naturalized	76.1%	92.6%
Foreign Born Noncitizen	67.7%	91.8%

Source: 2014 American Community Survey

Noncitizens are a key portion of younger adult workers

The age profile of immigrants, especially noncitizens, is one of the reasons that this is a key population. Overall, 37 percent of the labor force in the U.S. is aged 16-34, as seen in Table

3. For noncitizens the percent aged 16-34 is 40 percent.

Table 3
Age Distribution of Racial, Ethnic and Nativity Groups: U.S. 2014

	Total	Pct 16-34	Pct 16-24	Pct 25-34	Pct 35+
Total	100%	36.6%	14.5%	22.1%	63.4%
Native Born White Non-Latino	100%	33.7%	13.4%	20.3%	66.3%
Native Born Black Non-Latino	100%	42.2%	18.2%	24.0%	57.8%
Native Born Asian Non-Latino	100%	60.6%	24.0%	36.6%	39.4%
Native Born Latino	100%	56.4%	27.5%	28.9%	43.6%
Native Born Other Non-Latino	100%	51.8%	24.9%	26.9%	48.2%
Foreign Born Naturalized	100%	19.5%	4.6%	14.9%	80.5%

Foreign Born Noncitizen	100%	39.6%	10.5%	29.1%	60.4%
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Source: 2014 American Community Survey

Noncitizens are disproportionately found in the 25-34 age bracket. Some 29 percent of noncitizens in the labor force are aged 25-34, second only to the native-born Asian population, of whom 37 percent are aged 25-34.

The fact that noncitizens are somewhat concentrated among 25-34 year olds means they may be more likely than other groups, proportionally, to benefit from upskilling. The size and scope of the noncitizen, relatively young worker population merits emphasis: noncitizens are one in eight or 12 percent of all workers aged 25-34, and a worker aged 25-34 in the U.S. is more likely to be a noncitizen immigrant than a native-born African American or native-born Latino (Table 4). Only native-born White non-Latinos are more numerous than noncitizens in the workforce aged 25-34.

Table 4
Distribution of Age Categories by Race, Ethnicity and Nativity:
U.S. 2014

	16-24 Years of Age	25-34 Years of Age
Total	100.0%	100.0%
Native Born White Non-Latino	56.3%	55.9%
Native Born Black Non-Latino	12.9%	11.2%
Native Born Asian Non-Latino	2.2%	2.2%
Native Born Latino	15.9%	11.0%
Native Born Other Non-Latino	3.7%	2.6%
Foreign Born Naturalized	2.5%	5.3%
Foreign Born Noncitizen	6.5%	11.8%

Source: 2014 American Community Survey

Many noncitizens have low education levels

Noncitizens are the second-largest part of the labor force aged 25-34 yet they have extremely low levels of formal education. Some 11 percent of noncitizens have six or less years of education compared to less than two percent of the overall population, as seen in Table 5. About 20 percent of noncitizens have at least seven years of education but no high school, compared to only 10 percent of the overall population. Low education is a distinguishing feature of noncitizen workers aged 25-34 and by extension is a distinguishing feature of the skills required by many jobs in the U.S., as will be discussed later.

Naturalized immigrants, on the other hand, exceed the national average in having advanced education. Some 36 percent of the naturalized have a bachelor's degree compared to 27 percent of all persons. The naturalized are the group most likely to have an Associate's Degree, at almost 10 percent.

The fact that noncitizens have overall low levels of education and naturalized immigrants have high levels of education point to important underlying facts about immigration to the U.S. Naturalized immigrants by definition have been legally residing in the U.S. as legal permanent residents. The noncitizen population, meanwhile includes a combination of legal permanent residents who have not naturalized and immigrants who are undocumented. The noncitizen population in the U.S. (of all ages and both in and out of the labor force) consisted of about 22.4 million persons in the year 2014, according to the U.S. Census Bureau's American Community Survey.^{vii} The Pew Hispanic Center, a well-respected source of population estimates, estimates that in that same year the national population of unauthorized immigrants

was 11.1 million. These estimates together suggest that a large portion, approximately half, of noncitizens are undocumented. It is reasonable to assume that this ratio applies to workers in the labor force as well.

Table 5
Education by Race

	Total	<=6 years of schooling	7 years to no high school completion	High school only	Some college but no degree	Associate's Degree	Bachelor's degree or Higher
Total	100%	1.5%	10.4%	25.2%	28.5%	7.8%	26.6%
Native Born White Non-Latino	100%	.3%	8.4%	23.4%	28.2%	8.7%	31.0%
Native Born Black Non-Latino	100%	.5%	11.2%	30.6%	34.9%	6.8%	16.0%
Native Born Asian Non-Latino	100%	.4%	4.7%	14.5%	26.6%	7.0%	46.8%
Native Born Other Non-Latino	100%	.5%	11.2%	25.9%	33.1%	7.4%	21.9%
Native Born Latino	100%	1.1%	13.8%	30.2%	33.2%	7.4%	14.3%
Foreign Born Naturalized	100%	1.6%	7.1%	20.2%	25.3%	9.6%	36.2%
Foreign Born Noncitizen	100%	10.6%	19.5%	27.3%	15.7%	4.0%	22.9%

Source: 2014 American Community Survey

The data presented up to this point describe a noncitizen population that is a large part of younger workers aged 25-34 years of ages, but which consists of workers with low education levels. These facts suggest something about the nature of work and jobs, ie., that many jobs must in themselves be low-skill jobs requiring little preparation of workers.

While we can infer from the American Community Survey data that many jobs for 25-34 year olds are jobs of low-skill, there is a more direct way to establish the skill-levels of both jobs and workers. For that information we turn to the U.S. Bureau of Labor Statistics.

Does Immigrants' Education Match Their Job Needs?

The "Education/Job Match" Calculation

As described above, the American Community Survey (ACS) asks respondents about the level of education they have attained, such as high school or college. This information tells us what kind of skills and education immigrants and other workers bring to the job, but it does not tell us what kind of skills or education are expected of them by the job they're in.

Understanding the connection between educational attainment and job requirements would go a long way in assessing whether current levels of education are adequate for the jobs that exist.

Data from the U.S. Bureau of Labor Statistics (BLS) on the education or training typically expected of new hires for each occupation can be used to address the connection, or not, between workers' educational attainment and the expectations of their job. This information has been published annually by the BLS for approximately a decade. The BLS information on skills associated with jobs is coded for each occupation and may be linked to American Community Survey data, occupation by occupation. (Both the BLS and ACS use a similar set of occupational categories.)

Linking the BLS and ACS data provides an indication of the extent to which workers have more, enough, or not enough education given what is normally expected of them in the occupation they hold.^{viii} ***This report uses the term "Education/Job Match" to describe this comparison of worker education with their job requirements.*** A Methodology section at the end of this article describes the process of matching BLS and ACS information on occupations.

The table below provides a crosswalk between the BLS and Census data for the U.S. workforce aged 16-34 years. The first two columns are a distribution of the educational attainment of all U.S. workers, per the ACS, compared to a distribution of the skills typically required of new hires in the U.S., per the BLS.^{ix}

As seen in the table below, there is a disconnect between the number of low-skill workers and the number of low-skill jobs. If “low-skill” were considered to include persons with no high school, this includes almost 12 percent of U.S. workers aged 16-34 years. But 30 percent of jobs actually held by these workers do not require high school. These jobs, obviously, can only be filled by persons who have more formal education than what is required by their job.

Assessing “Education/Job Match” for U.S. Workers Aged 16-34 Years

Educational Attainment (per Census Bureau)		Education Typically Required for New Hire (per BLS)	
Total	100%	Total	100%
<=6 years of schooling	1.5%	No formal educational credential	30.1%
7 years to no high school completion	10.4%		
High school only	25.2%	High school diploma or equivalent	32.3%
Some college but no degree	28.5%	Postsecondary nondegree award	0.6%
		Some college, no degree	8.5%
Associate's Degree	7.8%	Associates degree	1.8%
Bachelor's degree	19.4%	Bachelor's degree	19.8%
Master's degree	5.3%	Master's degree	0.8%
Prof degree beyond bachelor's degree	1.1%	Doctoral or professional degree	2.2%
Doctoral degree	0.7%		

Source: U.S. Census Bureau, U.S. Bureau of Labor Statistics, author's calculations

The situation for persons with a high school degree is also out of balance with the number of jobs that require only high school. About 25 percent of the U.S. workforce aged 16-34 has only a high school degree, but 32 percent of the jobs these persons hold only require a high school degree (data not shown here). About 28 percent of the U.S. workforce aged 16-34 years has some college but no degree, while only about 9 percent of the jobs they hold require a comparable level of education.^x

Associates and master's degrees are particularly disconnected with the needs of employers. Almost eight percent U.S. workers aged 16-34 years have an associate's degree, but few of their jobs, only two percent, actually require such a degree of new hires. A similar finding is seen in the case of master's degrees: five percent of workers have a Master's but less than one percent of them is in a job that requires a Master's employment.

The table below graphically illustrates the disconnect between educational preparation of younger workers and the expectations of new hires in the jobs those workers hold. Table cells in green are workers with less education than typically needed for their job. Cells in blue describe persons whose education matches that of their job's entry requirements. Yellow cells are workers with more education than typically needed to enter their job they hold.

As may be seen in the table, millions of workers aged 16-34 years have educational attainment below what is required of new hires in their job. Summing the cells within the table reveals that, of the 56 million persons aged 16-34 in the labor force, about 29.2 million or 52 percent have more education than required by their job.

Another 18.1 million or 32 percent have exactly the education required of new hires in their job. Another 9.1 million or 16 percent have less education than required for new hires.

Most of these workers have either more, or less, but not exactly, the education that is needed for a new hire in their occupation. Of perhaps greatest concern is that half of the workers (52 percent) are arguably "over-educated" for the job they have.

Yellow: 52% of Young Workers Are Over-Educated for Their Job

Green: 16% of Young Workers Are Under-Educated for Their Job

Characteristics of Immigrants in Need of Training and Education

**The "Education/Job Match":
Educational Attainment of U.S. Workers Aged 16-34 Years vs. Education Typically Needed for their Job; U.S., 2014**

		Education Typically Needed for the Job They Have								
		No formal educational credential	High school diploma or equivalent	Some college, no degree	Post-secondary nondegree award	Associate's degree	Bachelors degree	Masters degree	Doctoral or professional degree	Total
Educational Attainment of the Worker	<=6 years of schooling	470,742	278,992	1,065	48,248	2,401	24,026	2,92	1,246	827,168
	7 years to no high school completion	3,206,367	1,696,550	13,314	363,209	19,833	188,598	6,208	4,532	5,501,172
	High school only	5,712,055	5,674,954	64,613	1,653,582	118,033	795,232	17,823	19,069	14,060,252
	Some college but no degree	5,672,314	6,267,642	128,848	1,867,585	287,126	1,765,729	54,830	78,218	16,124,649
	Associate's Degree	1,005,441	1,711,921	38,080	553,954	211,942	921,060	24,223	27,389	4,494,374
	Bachelor's degree	1,425,621	2,924,729	68,256	392,793	340,673	5,692,739	133,281	254,205	11,234,144
	Master's degree	151,942	377,485	8,503	72,361	52,529	2,028,229	195,353	215,708	3,102,209
	Prof degree beyond bachelor's degree	18,212	35,989	651	11,600	12,694	122,906	6,051	444,197	652,300
	Doctoral degree	6,261	19,496	700	4,621	3,146	115,117	7,171	242,297	398,809
	Total	17,668,955	1,8987,758	324,030	4,967,953	1,048,377	11,653,636	445,232	1,286,861	56,395,077

Source: 2014 American Community Survey; U.S. Bureau of Labor Statistics; author's calculations.
Note: Table excludes 12,275 workers for whom training and education could not be identified.

The table below uses the “education/job match” typology to compare the relative positions of the major racial/ethnic and foreign-born groups in the U.S. workforce. Of note, foreign-born noncitizen immigrants are the group least likely to be “over qualified” for their job. That is, only 43 percent of these immigrants have more education than what is typically required of new hires in their occupation.

Conversely, the same noncitizen immigrants are the group most likely to have less education than what is usually expected of new hires. Some 20 percent of the noncitizens are in this category and may be considered “under qualified.” No other group falls so far from the mean in both the overqualified and under qualified categories.

Table 6
Immigrants and the “Education/Job Match”

	Educational Attainment > Job Training	Educational Attainment = Job Training	Educational Attainment < Job Training	Total
Native Born White Non-Latino	52.3%	32.7%	14.9%	100.0%
Native Born Black Non-Latino	55.9%	28.2%	15.9%	100.0%
Native Born Asian Non-Latino	52.0%	34.5%	13.5%	100.0%
Native Born Latino	51.8%	30.0%	18.3%	100.0%
Native Born Other Non-Latino	54.7%	28.8%	16.4%	100.0%
Foreign Born Naturalized	50.3%	32.6%	17.1%	100.0%
Foreign Born Noncitizen	42.8%	36.8%	20.4%	100.0%
Total	51.7%	32.2%	16.1%	100.0%

Source: 2014 American Community Survey

Discussion

The findings of this analysis have implications for our understanding of the future of work in America for all workers and for immigrant workers in particular. Regarding the future of work, questions are often raised about whether today's workforce is adequately prepared for the jobs that are available. Many anecdotal accounts suggest that workers of all kinds are underprepared for the jobs openings that exist.

Yet the data described in this analysis contradict the anecdotal refrain about there not being enough qualified workers. The reality appears to be the opposite of anecdote: there aren't enough high-quality jobs, and too many jobs expect low levels of education of workers. Indeed, too many workers have obtained too much education given too few good jobs available.

The Bureau of Labor Statistics data on education and training typically expected of new hires – which forms the basis for my analysis of job expectations -- deserves deeper analysis and scrutiny. But the high-level findings presented here call for a reorientation of our criticisms away from worker quality and toward job quality.

Reflecting on the future of work in America, one might be tempted to assume that automation, off-shoring and other trends will cause a disproportionate decline in low-skill jobs, and thus a realignment in which (higher) skilled U.S. workers more in synch with the job market. There are two problems with this expectation. First, we don't know that enough jobs will be created for higher educated workers. Secondly, about half of U.S. workers aged 16-34

are currently overskilled for their job, and shifting such a massive portion of workers and jobs toward higher skilled environments is impossible to expect within even a few decades. This means that the current situation of too many skilled workers and too few skilled jobs is likely to be with us for a long time.

With regard to immigrants, they have an important place in the future of work because of their high share of the overall labor force, their high participation in the labor force and their high rate of employment. They disproportionately represent the future of work because they are concentrated in the relatively young 25-34 years age cohort.

The situation on noncitizens, who are one tenth of the labor force, is somewhat distinct from that of other major groups. For noncitizens, a disproportionate number are arguably under qualified for their job. That is, their education is less than what is typically needed for new hires in their job.

Particular qualities of noncitizen immigrants may explain the large number who find employment even while being under qualified. The noncitizens have the lowest levels of formal education among any major group, and on a probability basis they likely to be under qualified for the average job. But it is possible that noncitizens of little education may “punch above their weight” and find employment in jobs normally reserved for persons with more education. This latter idea is supported by the fact that these immigrants high labor force participation, by the fact that they arguably have less support available to them (being immigrants) and need to be more aggressive in meeting employers’ demands.

The large number of jobs that have low skill expectations of their workers has implications for noncitizen immigrants and for U.S. immigration policy. Given that so many jobs expect little in the way of education and training of their workers, and given that the group with, indeed, the lowest levels of formal education are noncitizen workers, it seems logical to expect continued demand for the immigration of workers to the U.S. from nations such as Mexico that have proved to be significant source of the kind of workers needed in so very many workplaces in the U.S.

Methodology

Linking American Community Survey and BLS Data by Occupation

The following describes the procedure used to link American Community Survey data on the occupations workers have with Bureau of Labor Statistics data on the education typically required of new hires by occupation.

Procedures

Major steps in this project involved assigning education and training information to 2014 American Community Survey (ACS) records. The 2014 ACS dataset was obtained from the Center for Migration Studies of New York (CMSNY), and was used because CMSNY flagged individuals in the ACS records as likely undocumented or not. The ACS records from CMSNY use 1990 occupational codes. Because occupational categories were redefined in both 2000 and 2010, a set of transformations were necessary to join the 1990 codes to current U.S. Bureau of Labor Statistics (BLS) education and training classifications. These steps included 1) use of a crosswalk to transform year 1990 occupation codes to year 2000 codes; 2) use of a crosswalk to transform year 2000 codes to year 2010 codes; and 3) assignment of BLS education and training classifications to 2010 codes. The resulting data set has education and training information for all occupations in the CMSNY microdata.

Specific adjustments had to be made during the transformations.

1990 to 2000

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In instances where a 1990 category split into multiple 2000 categories, the year 2000 occupational code chosen to be linked with 1990 was done on the basis of the category with the largest number of employed workers. The employment population numbers are found in the 1990 to 2000 crosswalk described below in Sources of Data.

2000 to 2010

In instances where 2000 categories were split into multiple 2010 categories, the year 2000 and year 2010 data were linked on the basis of employment population numbers tabulated by the author from the American Community Survey.

Assigning BLS education and training.

In some instances, BLS education and training information was provided for sub-categories of year 2010 occupations. In these cases, assignment of education and training to a year 2010 occupation was done on the basis of the BLS category with the largest employed population. A table with employed numbers of persons in each BLS category is available from BLS.

Sources of Data

2014 American Community Survey

This survey is available at the U.S. Census Bureau at <https://www.census.gov/programs-surveys/acs/>

Bureau of Labor Statistics Data on Training/Education Expected of New Hires

This is available from the BLS Employment Projections Program at

https://www.bls.gov/emp/ep_data_occupational_data.htm

Crosswalk Between 1990 to 2000

The source of information on how to transform and allocate 1990 occupational codes to 2000 occupational codes is Scopp, Thomas S. *The Relationship Between the 1990 Census and Census 2000 Industry and Occupation Classification Systems, Technical Paper #65*, Washington, DC: U.S. Department of Commerce, Economic and Statistics Administration, U.S. Census Bureau. October, 2003. Accessed May 1, 2017 at

<https://www.census.gov/people/io/files/techpaper2000.pdf>

This source included frequency tests for all 2000 occupational codes that matched up to a certain 1990 occupational code. These frequency tests were used to establish the plurality for the 325 cases where the 1990 occupational code split into multiple 2000 occupational codes. Of these 325 cases, 289 were a simple majority as well as being a plurality. Nine cases had a close second within 5% of the 2000 occupational code that held the plurality.

Crosswalk Between 2000 to 2010

The source of information on how to translate and allocate 2000 occupational codes to 2010 occupational codes is a crosswalk file published by the U.S. Census Bureau. Accessed May 1, 2017 at

https://www.census.gov/people/io/files/2010_OccCodeswithCrosswalkfrom2002-2011nov04.xls

In the case where a 2000 occupational code split into multiple occupational codes in 2010, the 2010 occupational code with the plurality of cases was assigned to the 2000 occupational code. This plurality was established through one of two frequency tests. The first frequency test was run using the American Community Data for 2011-2015. A second frequency test using the U.S. Bureau of Labor Statistics data for 2016 was run for cases where the ACS data did not break up into the specific 2010 occupational codes. Either or both of these frequency tests were run for 119 cases where the 2000 occupational codes broke up into multiple 2010 occupational codes. Of these 119 cases, 89 cases were a simple majority as well as being a plurality. Ten cases had a close second within 5% of the 2010 code that held the plurality.

Education and Training of 2010 Occupations

For information on the education and training related to each occupation, the source is the education and training classification system of the U.S. Bureau of Labor Statistics, as reported in the Occupational Projections Data database at <https://data.bls.gov/projections/occupationProj>. The database includes year 2010 occupational codes linked to Standard Occu BLS also provides a table of employed population for each of its Standard Occupational Categories, as of May, 2016, at https://www.bls.gov/oes/current/oes_nat.htm.

Occupational training was assigned to 1990 occupational codes using the Standard Occupational Categories code which were assigned to each 2010 occupational code.

Special Case: Postsecondary Teachers

From 1990 to 2000, 30 occupational codes were combined to form the 2000 occupational code “220”, or “Postsecondary teachers”. From 2000 to 2010, this occupational code was split back out into its more specified postsecondary teacher categories. Thus, the 1990 occupational codes for postsecondary teachers (113-119, 123-129, 133-139, 143-149, 153) were hand matched to the 2010 codes.

Special Cases: Occupation Training Assignment

The 2010 SOC code 25-3090 broke into “Teachers, all other, except substitutes” and “Substitute Teachers”. For the purposes of the match we considered them both to have the training of “Teachers, all other”.

Additionally, the 1990 occupational code “737” or “Bookbinding”, disappeared in the 2000 to 2010 crosswalk. Thus this 1990 occupational code was assigned the occupational skills of “Print Binding and finishing workers”.

ⁱ Pew Hispanic Center, “10 demographic trends shaping the U.S. and the world in 2017” April 27, 2017; accessed December 13, 2017 at <http://www.pewresearch.org/fact-tank/2017/04/27/10-demographic-trends-shaping-the-u-s-and-the-world-in-2017/>.

ⁱⁱ Carnevale, Anthony P.; Jayasundera, Tamara; Gulish, Artem *America's Divided Recovery, College Haves and Have Nots* 2016. Georgetown University Center on Education and the Workforce 2016.

ⁱⁱⁱ *Ibid.* page 33.

^{iv} National Skills Coalition "Middle-Skill Credentials and Immigrant Workers: Texas' Untapped Assets" Accessed December 13, 2017 at <http://www.NationalSkillsCoalition.org>.

^v Norris, Ann "Stuck in the middle: job market polarization" *Monthly Labor Review* July 2015.

^{vi} *Ibid.* page 3.

^{vii} U.S. Census Bureau, 2014 American Community Survey 1-Year Estimates, at American Factfinder, <https://factfinder.census.gov>. Table S0501. Accessed on December 17, 2017

^{viii} The Bureau of Labor Statistics, in describing its estimates of education needed for job entry, notes that for some workers their educational attainment may not match what is required by their job because the worker has obtained more education after becoming employed. BLS also notes that the education typically needed for entry into a job today may be different than what was required in the past, and today's job requirements for new entries may not apply to experienced workers. Also, BLS categorizes jobs by the education typically needed for entry, but there may be multiple paths to entry in a given job. For example, BLS reports that a bachelor's degree is typically needed for entry into nursing, but there are some nursing jobs that require only an associate's degree.

^{viii} The ACS and BLS each use slightly different categories, thus, for example, I equate the ACS categories of seven years or less of schooling to the BLS category of "no formal education credential."

^{ix} The ACS and BLS each use slightly different categories, thus, for example, I equate the ACS categories of seven years or less of schooling to the BLS category of "no formal education credential."

^x BLS provides two categories of education that together approximately correspond to the Census Bureau category of "some college but no degree."