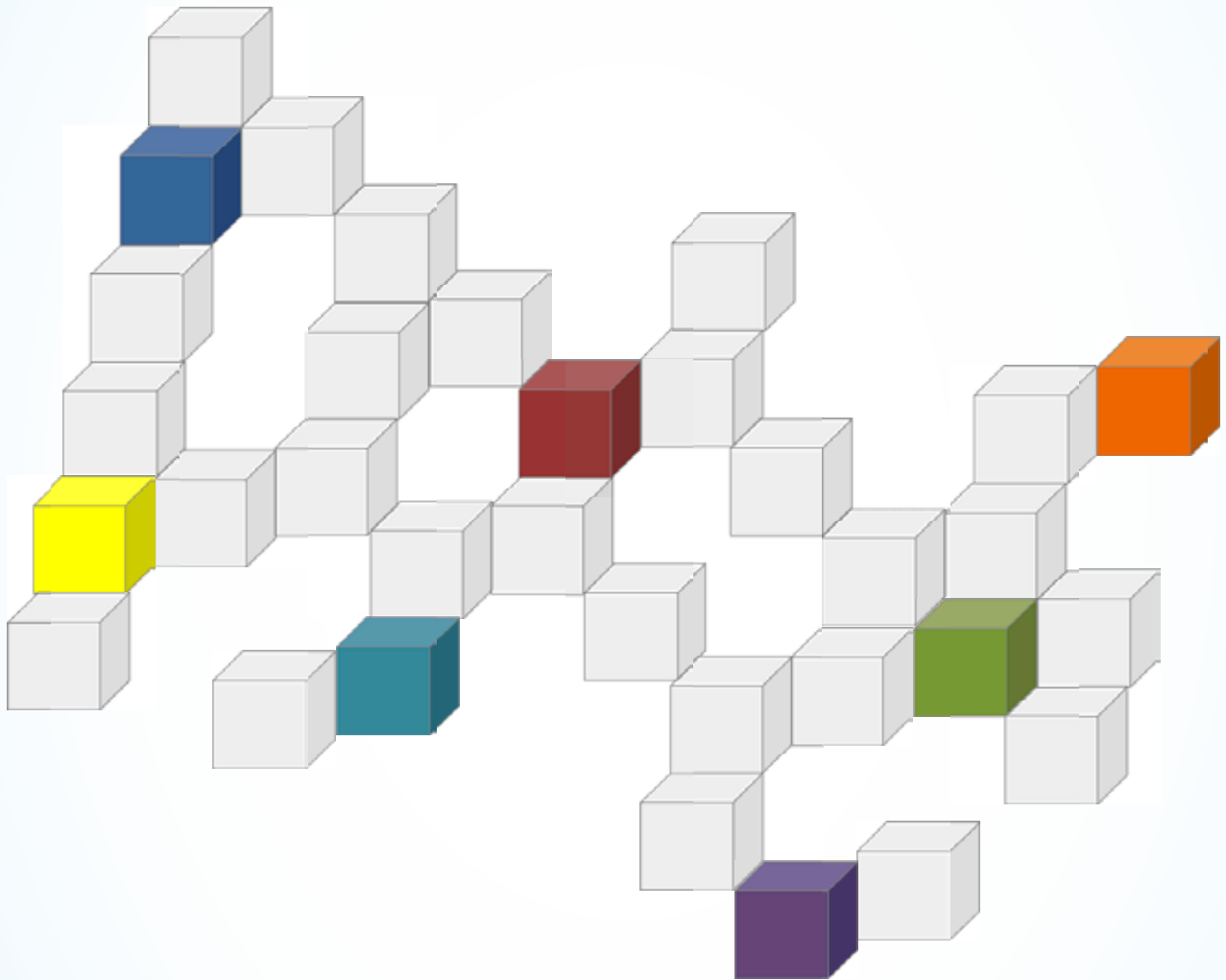
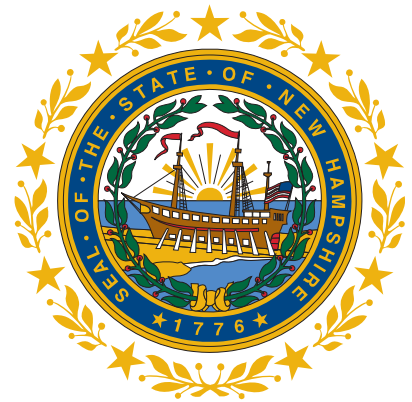


Perspectives on Middle Education Occupations in New Hampshire



Economic and Labor Market Information Bureau,
New Hampshire Employment Security
August 2017

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Perspectives on Middle Education Occupations in New Hampshire

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Introduction

New Hampshire’s labor market has improved substantially since the end of the Great Recession in 2009. Jobs in nonfarm employment reached a historical high in 2016¹ and the unemployment rate continues to rank among the lowest in the nation. The outcry for programs to help the unemployed has quieted, while workforce education and training programs designed to upgrade worker skills and meet employer demand have sprouted like weeds.

Occupations with higher levels of education — a Bachelor’s degree and above — have long been proven the road to career success. People with more education have been statistically shown to have lower unemployment rates and higher earnings over their lifetime.² But not everyone wants a job that requires at least four years of college, regardless of prospective financial benefits. For many, middle education occupations are the answer to career success.

What exactly are “middle education” occupations? These are jobs in the middle of the labor market, those that usually require more than a high school diploma but less than a four-year degree for entry-level employment. Middle education occupations are sometimes called “middle skill” occupations; however, the actual skills needed for each occupation are not easily analyzed, whereas typical entry-level education and training for each occupation is readily available.

The career value of middle education occupations is wide-spread. According to the New Hampshire Department of Education, nearly 23 percent of 2016 high school graduates intended to enter postsecondary education other than a four-year college — and that percentage was divided evenly between males and females.³ Roughly 37 percent of New Hampshire residents age 18 and over have not attained education beyond a high school diploma.⁴ For many people in New Hampshire, middle education occupations can make career advancement achievable with minimal time and expense investments. Middle education occupations are also well-suited for apprenticeships, an opportunity to earn wages while learning a job and gaining valuable experience. Middle education occupations will continue to meet a variety of labor market needs, both now and into the future.

Jobs in middle education occupations are significant to New Hampshire’s economy and its workforce. The following analyses provide a variety of perspectives on the jobs and workers in middle education occupations, and their impact on the New Hampshire workforce.

¹ Current Employment Statistics, 2016 Benchmark

² U.S. Bureau of Labor Statistics, Earnings and unemployment rates by educational attainment, 2015. Data are for persons age 25 and over; earnings are for full-time wage and salary workers. https://www.bls.gov/emp/ep_chart_001.htm

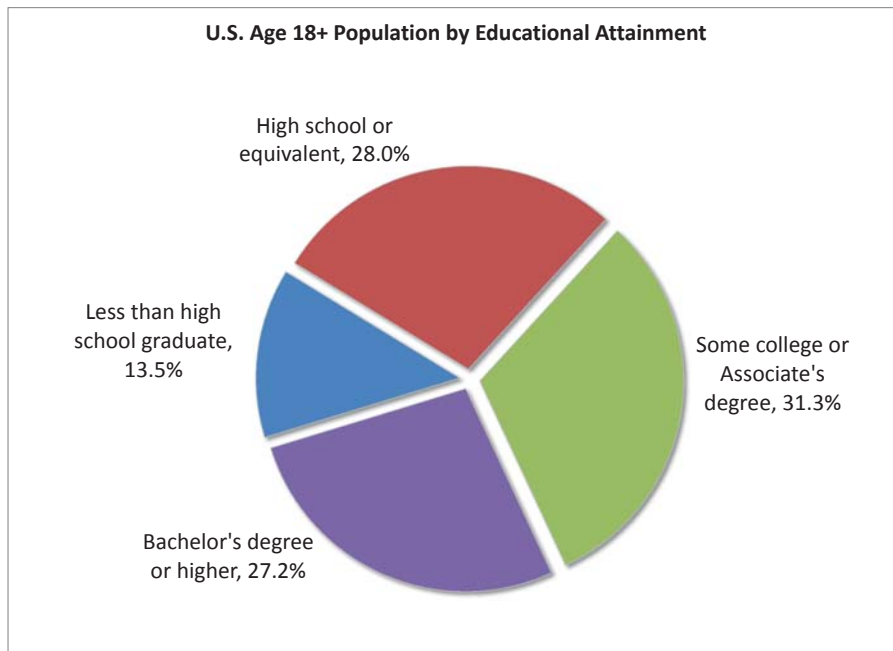
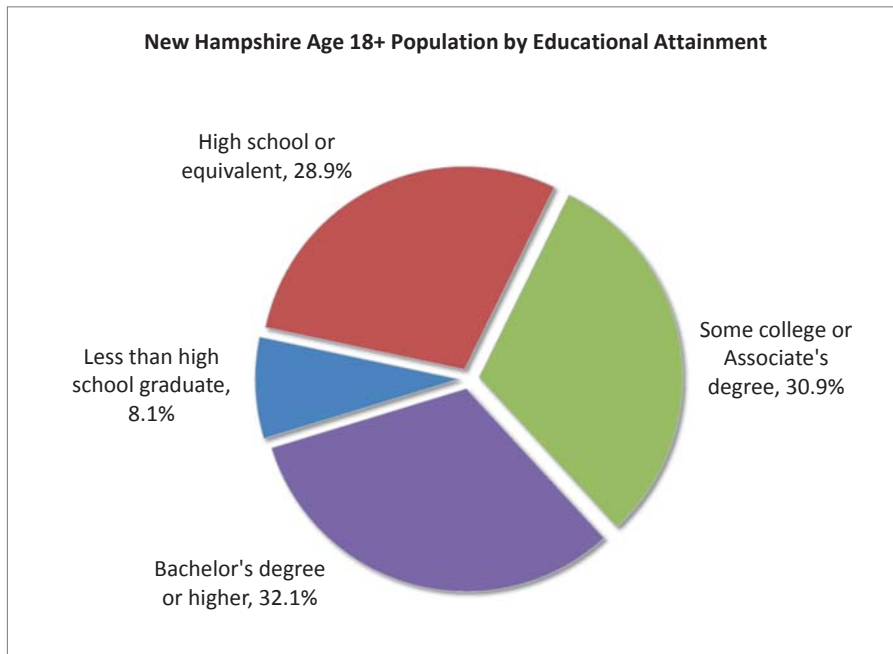
³ New Hampshire Department of Education, Bureau of Accountability, Data Analysis and Management, 2015 – 2016 State Total Completers by Category in Public Schools and Public Academies. February 24, 2017.

⁴ U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates, Table S1501

Overview

Educational Attainment in New Hampshire

There are only small differences in the shares of New Hampshire’s population age 18 and over when divided among three levels educational attainment: 28.9 percent hold a high school diploma or equivalent; 30.9 percent have completed some college or an Associate’s degree; and 32.1 percent hold a Bachelor’s or higher degree. Among residents age 18 and over, 8.1 percent have less than a high school education. Compared to the U.S. as a whole, New Hampshire has a smaller share of residents with less than a high school education, and a larger share with a Bachelor’s degree or higher.



Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates, Table S1501

New Hampshire residents under age 18, who presumably have not yet completed secondary education, represent 20.5 percent of the state's total population, compared to 23.3 percent for the U.S. as a whole. New Hampshire's smaller share of residents under the age of 18 is a reflection of the state's median age of 42.2 years, the third highest among the states.⁵

Middle Education Occupations Defined

The U.S. Bureau of Labor Statistics, Employment Projections Program, establishes the typical education, related work experience, and on-the-job training needed for entry-level employment in each occupation.⁶ For purposes of this analysis, middle education occupations have been defined as occupations with typical entry-level education, experience, and training requirements of:

- (1) A high school diploma or equivalent plus related work experience or at least one year of on-the-job training (long-term OJT), including apprenticeship;
- (2) Up to two years of postsecondary education, resulting in a non-degree certificate;
- (3) Some college-level education, without completion of a degree; or
- (4) An Associate's degree.

Based on this definition, middle education occupations cover a wide spectrum of work activities.⁷ There were 180 occupations meeting the criteria; all occupational groups with the exception of Community and social services occupations were represented. Among these middle education occupations, 44 are related to science and engineering, apprenticeship is a training option for 112, and 30 occupations require a New Hampshire license to practice.

⁵ U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates, Tables B01003 and B09001

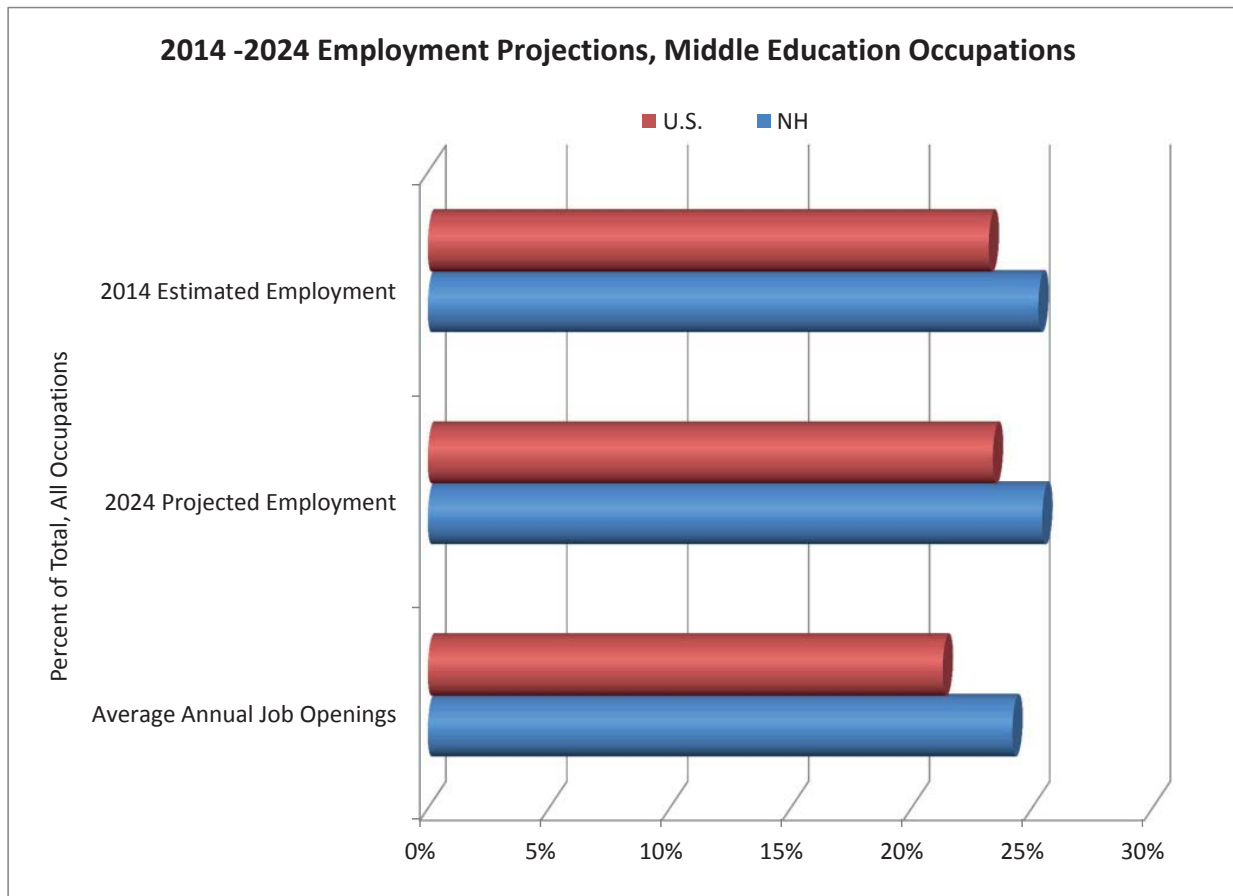
⁶ See Appendix A for a complete description of entry-level education, related work experience, and typical on-the-job training required to attain competency.

⁷ See Appendix B for a full list of middle education occupations.

Future Outlook for Middle Education Occupations

From 2014 through 2024, employment in New Hampshire is projected to grow by 7.0 percent, gaining just over 47,000 jobs. The annual average number of job openings is expected to reach 21,370. Roughly 75 percent of annual job openings will be due to replacements — the need to replace a worker who leaves the occupation, largely because of retirement.

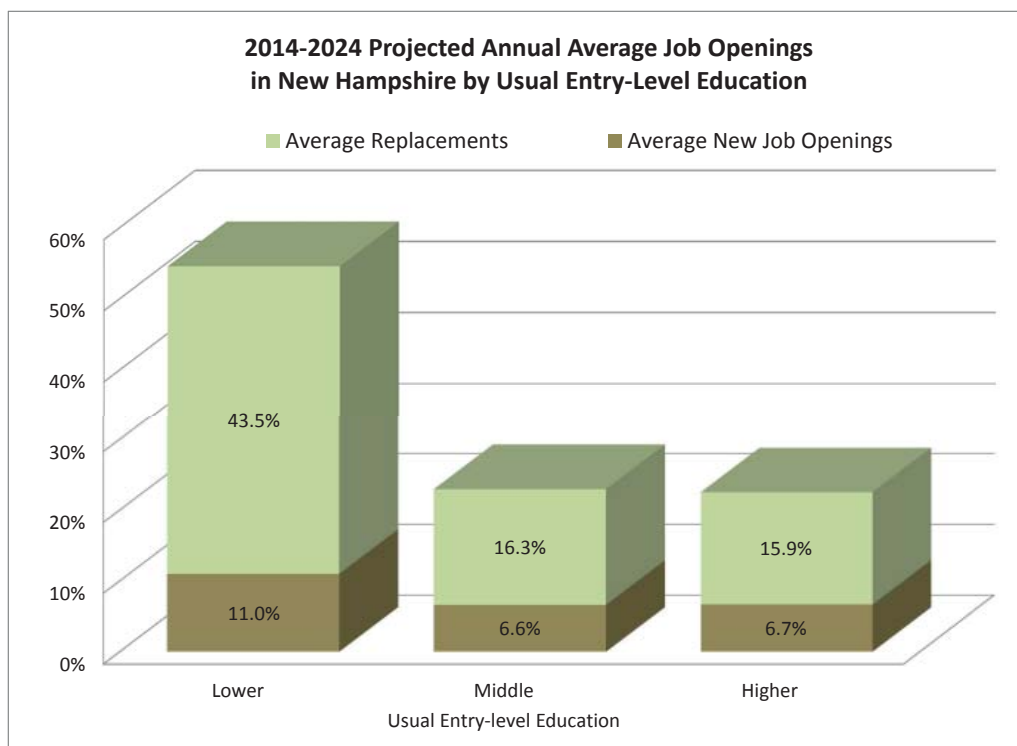
In 2014, about 25 percent of estimated employment in New Hampshire was in occupations with middle education entry-level requirements. That share is projected to remain the same through 2024. Compared to the U.S. as a whole, the share of both employment and average annual job openings for middle education jobs in New Hampshire is roughly two percentage points higher.



Sources: Economic and Labor Market Information Bureau, NH Employment Security; U.S. Bureau of Labor Statistics

There is a general idea that employment growth in higher-education occupations and lower-education occupations will squeeze out jobs requiring mid-level education and/or training. Demand for workers in middle education jobs, however, is not disappearing.

Comparing the share of projected annual average job openings for occupations in the three levels of education shows that replacement openings — those caused by workers leaving an occupation for a different occupation or departing the workforce — continue to represent the largest portion of annual average job openings. While occupations usually requiring lower levels of education for entry-level employment hold the largest share of all openings, occupations usually requiring middle and higher levels of education are nearly equal, in both new job openings and replacements.



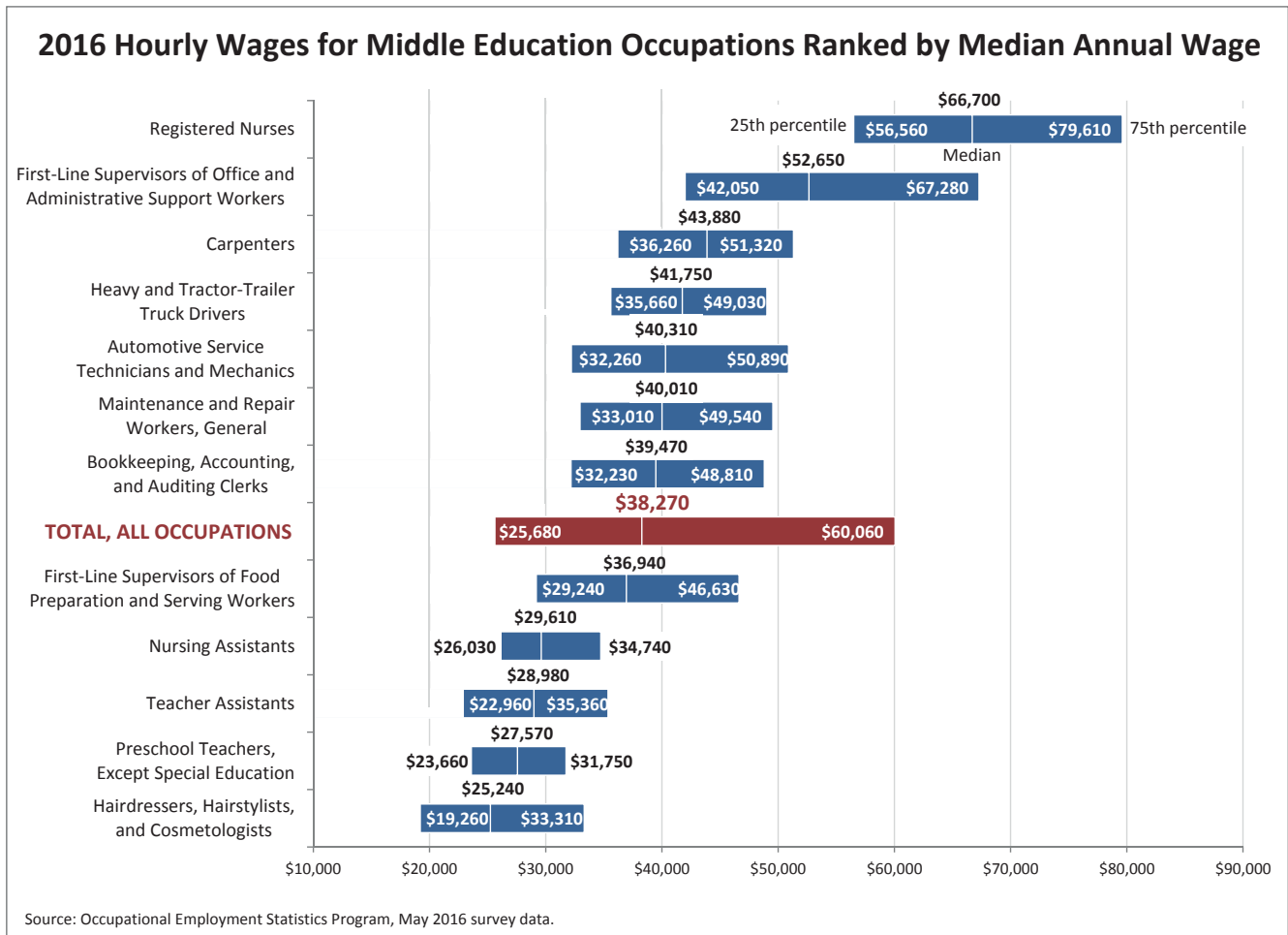
Source: Economic and Labor Market Information Bureau, NH Employment Security

Middle Education Wage Ranges

In 2016, the median annual wage⁸ for all occupations was \$38,270. Among the middle education occupations,⁹ 80 percent had a median annual wage above the median for all occupations. Median annual wages ranged from about \$25,000 for Bailiffs, Hairdressers, hairstylists, and cosmetologists, and Manicurists and pedicurists to \$100,000 for Transportation, storage, and distribution managers and Air traffic controllers.

⁸ Wage data are based on the May 2015 occupational wage survey results (the latest available) updated to June 2016 using the Employment Cost Index (ECI), a quarterly measure of changes in labor costs produced by the U.S. Bureau of Labor Statistics. Updated occupational wages provides data users a better idea of current wage estimates.

⁹ Among the 180 occupations identified as middle education, New Hampshire wage data were not available for 41 occupations.



Comparing annual wages at the 25th percentile, 94 percent of middle education occupations with available data ranked above the \$25,680 25th percentile wage for all occupations. Middle education occupations were less likely to rank among the highest wages, however. The annual wage at the 75th percentile was \$60,060 for all occupations. Among the 140 middle education occupations (with available data), half of the occupations had a 75th percentile wage above that value, while half were below.

Of the 12 middle education occupations with the highest estimated employment in 2014,¹⁰ seven had median annual wages above the \$38,270 median wage for all occupations in New Hampshire. At the 25th percentile, nine of the 12 largest occupations had annual wages above the total for all occupations. Fewer of these 12 occupations bested the \$60,060 annual wage for all occupations at the 75th percentile, with just two of the largest occupations having higher annual wages at the 75th percentile.

Overall, these comparisons indicate a strong average wage potential for workers in middle education occupations.

¹⁰ Occupations selected had the largest estimated number of workers in 2014 meeting middle education criteria. New Hampshire Occupational Employment Projections, Economic and Labor Market Information Bureau, NH Employment Security

Interests

O*Net, the Occupational Information Network, compiles standardized descriptors of hundreds of occupations.¹¹ One descriptor is a worker's occupational interests, which indicates preferences for work environments. The interest profile, aligned with the Holland Theory of Career Choice,¹² identifies six work environments to which occupations, and the workers in those occupations, are strongly connected. The six types are *Realistic*, *Investigative*, *Artistic*, *Social*, *Enterprising*, and *Conventional*, commonly referred to as RIASEC. A worker whose interests are aligned with the interest profile of an occupation is more likely to find their work environment rewarding.¹³

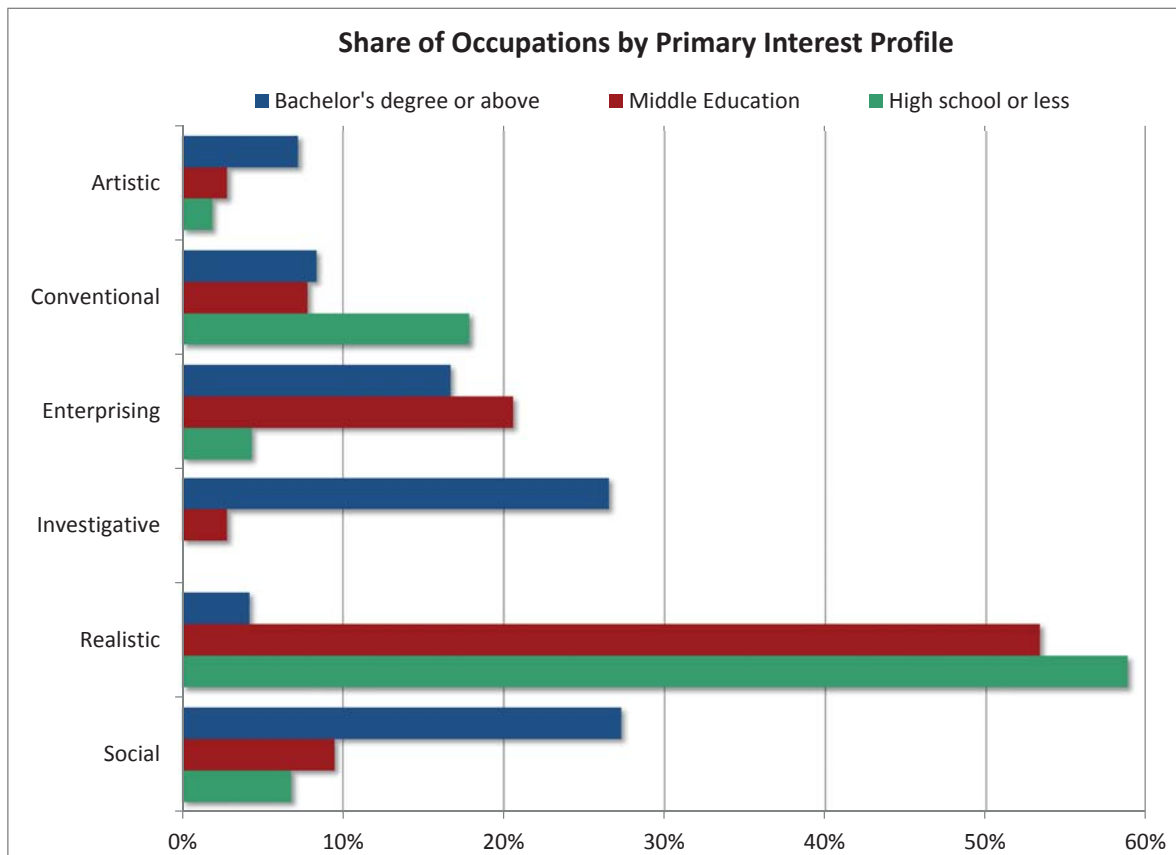
Comparing the share of occupations with common primary interest profiles clearly illustrates the differences between middle education occupations and occupations requiring higher education (Bachelor's degree or above) for entry-level employment. Middle education occupations are most likely to have a *Realistic* profile, as are lower education occupations — those usually needing a high school diploma or less for entry-level employment.

The largest share of occupations with an *Enterprising* interest profile is in middle education occupations, as are smaller shares of occupations with *Social* and *Conventional* interest profiles. Among occupations with a *Conventional* interest profile, the largest share is most likely to need only a high school diploma or less education. Higher education occupations are more diverse in interests, and have large shares of occupations with *Social*, *Investigative*, and *Enterprising* interest profiles, as well as the largest share of occupations with an *Artistic* interest profile.

¹¹ O*Net Content Model, <https://www.onetcenter.org/content.html>

¹² John L. Holland developed the theory that people can be described by a combination of six personality types. The theory proposed that people seek out work environments that match their personality type. A better match means more job satisfaction, because the person finds the job interesting. Occupations can be assigned a Hollands code just as people can determine the Holland type for their own personality. <https://www.careerkey.org/choose-a-career/hollands-theory-of-career-choice.html>

¹³ For more on interest profiles with New Hampshire-specific information, see <http://www.nhes.nh.gov/elmi/career/career-assess.htm>



Source: O*Net Interest Profile, <https://www.onetonline.org/>

As defined in the O*Net Content Model,¹⁴ the top interest profiles for middle education occupations are described as:

- Realistic occupations frequently involve work activities that include practical, hands-on problems and solutions. They often deal with plants, animals, and real-world materials like wood, tools, and machinery. Many of the occupations require working outside, and do not involve a lot of paperwork or working closely with others.
- Enterprising occupations frequently involve starting up and carrying out projects. These occupations can involve leading people and making many decisions. Sometimes they require risk taking and often deal with business.

People whose interest profile is primarily Realistic or Enterprising should find many middle education occupations of interest as a career.

¹⁴ O*Net Content Model, <https://www.onetcenter.org/content.html>

Educational Attainment of the Current Workforce by Age

Business and educational leaders are calling for an increase in the educational and skills attainment for the state's working age population to meet future workforce needs. In order to assess such policy goal, it is important to evaluate the educational attainment of New Hampshire's current population. Despite the state showing a higher level of educational attainment than the nation overall, evaluating the educational attainment for the New Hampshire population by age groups shows significant differences between younger and older age groups.

Author: *Annette Nielsen, Economist*

The New Hampshire Coalition for Business and Education, a group of educators, business, and government leaders has endorsed a statewide workforce goal called “65 by 25.” Based on estimates of the Granite State’s future workforce needs, the initiative’s goal is to have 65 percent of the state’s working age adults hold a postsecondary degree or a high-value credential by 2025, hence the “65 by 25.”¹⁵

In order to discuss the above and similar initiatives, it is important to evaluate the educational attainment of New Hampshire’s current population. According to Lumina Foundation estimates, New Hampshire’s postsecondary attainment rate was 49.2 percent in 2014. This rate is based on New Hampshire’s working age population (age 25-64) with an educational attainment of an *Associate’s degree* or higher and residents with high-quality certificates.¹⁶

Overall, the educational attainment of New Hampshire’s population is high in comparison to the nation. According to the 2015 American Community Survey, 64.6 percent of New Hampshire’s population age 25 and over had attained education above a high school diploma (includes *Some college, no degree* through *Graduate or professional degree*). In comparison, only 59.6 percent of the nation’s population attained education above a high school diploma in 2015.¹⁷

The educational attainment of New Hampshire’s population age 25 and over has improved over time. In 2005, the share of New Hampshire’s population with educational attainment above a high school diploma was 59.2 percent, which improved to 64.6 percent by 2015. Whether the state is close to achieving the goal of “65 by 25” is hard to say as there is a large share of the population with *Some college, no degree*. In 2015, 19.2 percent of New Hampshire population age 25 or over had achieved *Some college, no degree*. The Georgetown University Center on Education and the Workforce estimated that 2.0 percent of New Hampshire residents had attained high-value postsecondary certificates as their highest earned credential in 2014.¹⁸ This means that a large group of residents could still gain from achieving a postsecondary credential or high-quality certificate.

When broken down by age groups, however, the data from 2015 ACS shows that the age groups 25-34 and 35-44 years old have achieved higher levels of educational attainment than the age group 45-64.¹⁹ Among the New Hampshire population age 25 to 34, 29.1 percent have attained a *Bachelor’s degree*, whereas only 21.1 percent of the age group 45-64 years have attained a *Bachelor’s degree*. Conversely, 25.1 percent of the population age 25 to 34 had attained only a high school diploma in comparison to 29.4 percent of the New Hampshire population age 45 to 64.

¹⁵ New Hampshire Coalition for Business and Education. Actions to support recommendations made by the 65x25 Work Group. Accessed on May 8, 2017 at <http://www.nhcbe.org/actions/>

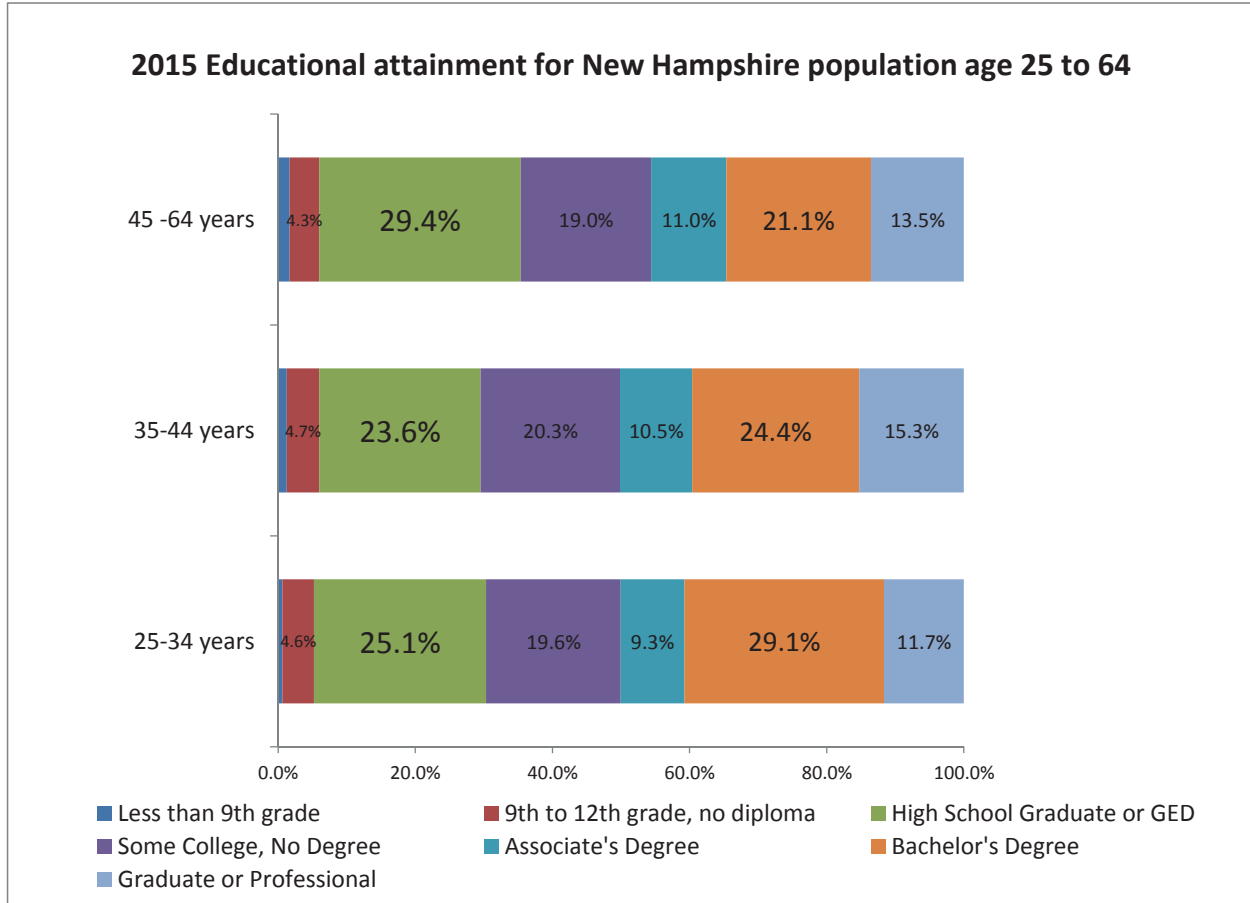
¹⁶ A stronger nation: Postsecondary learnings builds the talent that helps us rise. Lumina Foundation. Accessed on March 21, 2017 at <http://strongernation.luminafoundation.org/report/2016/#new-hampshire>

¹⁷ U.S. Census Bureau, 2015 American Community Survey 1-Year Estimates. Table: S1501

¹⁸ Lumina Foundation, op. cit.

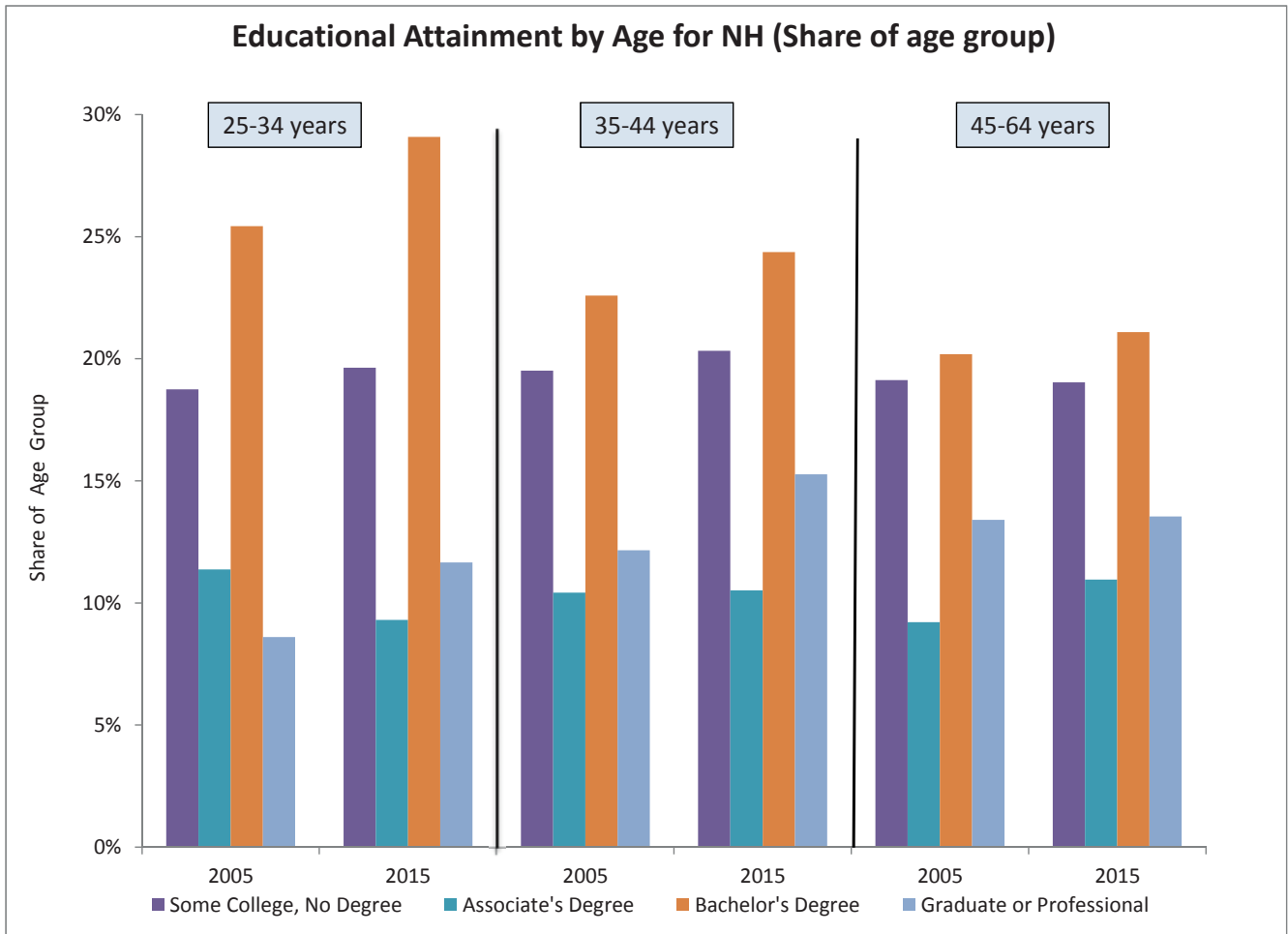
¹⁹ As a majority of students are in their mid-twenties before they have acquired their highest level of educational attainment, the educational attainment rate measure uses age cohorts starting at 25. The cohort ending at the age of 64 is used as the upper level for this working age cohort measure as the labor force participation rate is drastically reduced for the age groups 65 and older.

The age cohort 25-34 years, though, has a lower share of the population with a *Graduate or professional degree* in comparison to the two older age cohorts. In many professional jobs, some work experience is encouraged before the person pursues a graduate degree; in other cases, workers are encouraged to pursue post-baccalaureate education later in life for professional development or other advancement opportunities.



Source: U.S. Census Bureau, 2015 American Community Survey 1-Year Estimates

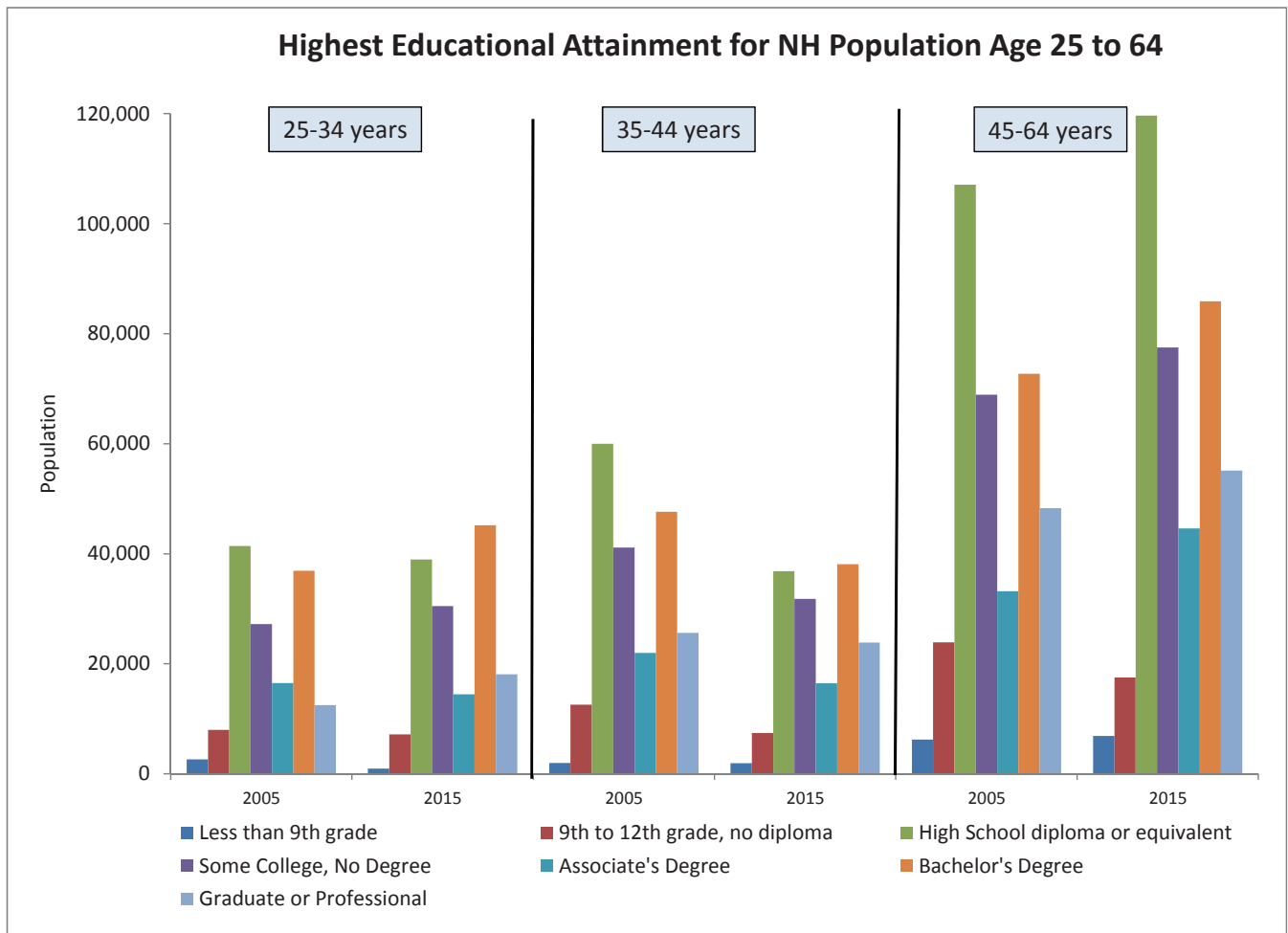
When comparing these same three age cohorts over time, the ACS data show that educational attainment has risen for the two younger cohorts, but to a lesser degree for the age cohort 45 to 65 years. From 2005 to 2015, the share of the age cohort 25 to 34 years with educational attainment beyond high school increased from 64.2 percent to 69.7 percent - a gain of more than five percentage points. The age cohort 35 to 44 years experienced similar large improvements in educational attainment, whereas the age cohort 45 to 64 years experienced a more modest improvement of 2.7 percentage points. In the younger age cohort (age 25-34 years), the population with a *Bachelor's degree* improved the most, whereas the largest improvement in the age cohort 35-44 years was for a *Graduate and professional degree* and for the oldest cohort, most gain was at the *Associate's degree* level.



Source: U.S. Census Bureau, 2015 American Community Survey 1-Year Estimates

Assessing the numeric changes in the population by educational attainment between 2005 and 2015 show how the age cohort 45-64 years has grown by a substantial amount while the age cohort 35-44 years actually shrank.²⁰ In the age cohort 45 to 64 years, all educational attainment groups grew in numbers, with the exception of those with *9th to 12th grade, no diploma*. However, the one educational attainment group that added the most in the age cohort 45-64 years was those with just a high school diploma. In 2005, there were approximately 108,000 residents age 45 to 64 with a *High school diploma or equivalent* and by 2015, the number of residents in this age cohort with a *High school diploma or equivalent* grew to about 120,000.

²⁰ Note that the age cohort 45-64 spans over twenty years, as opposed to the other two age cohorts which each encompass ten years. Data from American Community Survey is only available by these age cohorts.

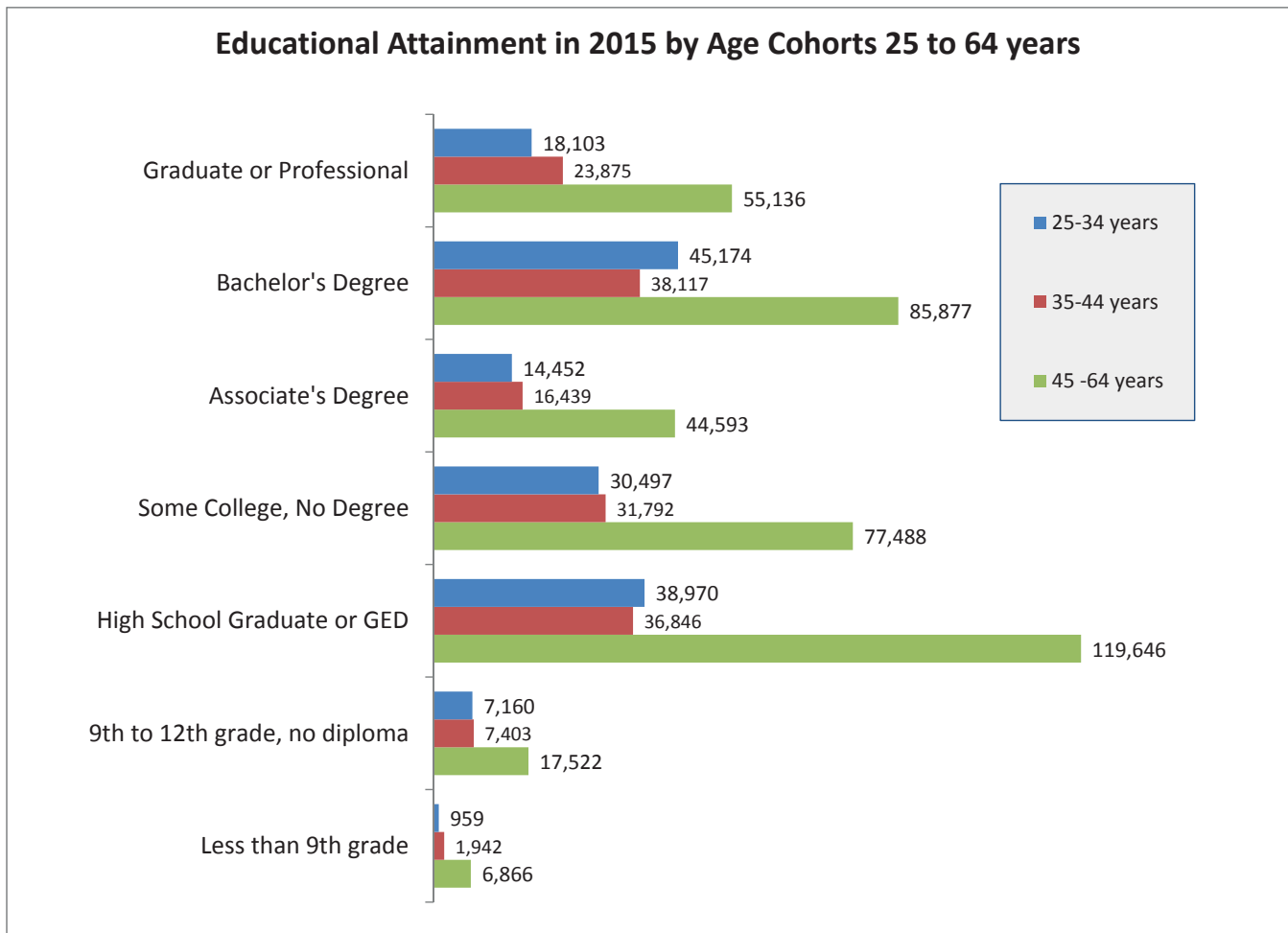


Source: U.S. Census Bureau, 2015 American Community Survey 1-Year Estimates

In 2015, the largest cohort of New Hampshire residents was in the age group 45 to 64 years with just a *High school diploma or equivalent*.²¹ Additionally, there is also a large group of residents in the age group 45 to 64 years with *Some college, no degree*. These two groups combined (age 45 to 64 with educational attainment of *High school diploma or equivalent* or *Some college, no degree*) has grown over the last ten years, from about 175,000 to close to 200,000 New Hampshire residents.

Most often, the discussion of postsecondary education is centered around the potential pipeline of younger workers, but the data on educational attainment by age suggest that the older cohort of New Hampshire’s working age population have not attained the same level of education that the younger workers have.

²¹ Even after adjusting for the larger cohort age span, this age group is larger than the two younger cohorts.



Source: U.S. Census Bureau, 2015 American Community Survey 1-Year Estimates

Data from the Current Population Survey from 2016 show that the unemployment rate for older New Hampshire workers (age 55 to 64) was 2.6 percent, which is slightly higher than the cohort ages 25 to 34, at 2.4 percent. The unemployment rate for the age group 45 to 54 was, on the other hand, much lower at 1.9 percent. Despite the lower level of educational attainment, there are only slight differences in the success in the labor market. One reason could be that in lieu of education, older workers tend to have extensive work experience. Average weekly earnings for the older age cohorts are higher than earnings for the younger cohorts, even though the younger cohorts have attained a higher level of education. The wage progression is an indication that years of work experience pay off.²²

It is important to acknowledge the potential need for training or upskilling of this large cohort of the population, those age 45-64 years with a *High school diploma* or *Some college, no degree* as the highest level of educational attainment. Some of these older workers will age out of the workforce over the next ten years, but the majority will still be participating and the labor market will need them. As most of these workers are currently employed, training should be approached from

²² U.S. Census Bureau, unpublished Current Population Survey data for 2016 (12 Month Average). Average weekly earnings for New Hampshire's full-time workers in age cohort 25-34 was \$933.10 in comparison to average weekly earnings for New Hampshire's full-time workers of \$1,278.30 for age cohort 45-54 and \$1,201.70 for age cohort 55-64.

the perspective of finding ways to provide these workers with additional skills and educational enhancement (upskilling) in their field of expertise. Rather than retraining these workers in new fields, efforts should be explored to find ways to build upon the applied knowledge these workers might have and provide additional skills that will be needed in the future labor market.

A look at the younger talent pipeline

Feeding the workforce with new, highly-educated workers is a somewhat complicated equation influenced by migration patterns. In the past, New Hampshire has relied on highly-educated workers moving into the state. As the state’s population growth has slowed, policymakers and other stakeholders have raised concerns that more should be done to retain and regain college graduates to the state.

According to 2014 data from National Center for Education Statistics, New Hampshire saw a net gain of 1,159 first-time undergraduate students.²³ This number was calculated by subtracting the number of recent high school graduates from New Hampshire that are enrolled at a postsecondary institution in another state (4,864) from the number of freshmen enrolled in New Hampshire’s postsecondary schools that come from other states (6,023 students). This net gain indicates that New Hampshire’s postsecondary institutions are successful at attracting students from other states. Of the 9,888 New Hampshire first-time students enrolled in degree-granting postsecondary institutions in 2014, about half the students were enrolled out-of-state.

IPEDS 2014 Fall Enrollment		
	count	share
Freshmen Enrollment at NH Postsecondary Institutions	11,047	
In-state students	5,024	45.5%
Out-of-state students	6,023	54.5%
Freshmen from NH Enrolled Anywhere		
Going In-State	5,024	50.8%
Going Out-of-State	4,864	49.2%

Also, the 11,047 first-time undergraduate students enrolled at postsecondary degree-granting institutions in New Hampshire are only a slice of the total enrollment in New Hampshire for all degree-granting institutions. In 2015, total enrollment numbered 123,966, jumping from 106,984 in 2014. In the most recent years, enrollment in degree-granting institutions in New Hampshire has surged due to online students, many of whom do not reside in New Hampshire.²⁴

²³ This estimate is based on IPEDS data on 2014 Fall Enrollment: Residence and migration of first time freshman: Fall 2014 (revised January 2017). First time undergraduate students are defined as first-time degree/certificate-seeking undergraduate students who graduated from high school in the past 12 months. Date represent educational institutions reporting fall enrollment for the 2014-2015 school year.

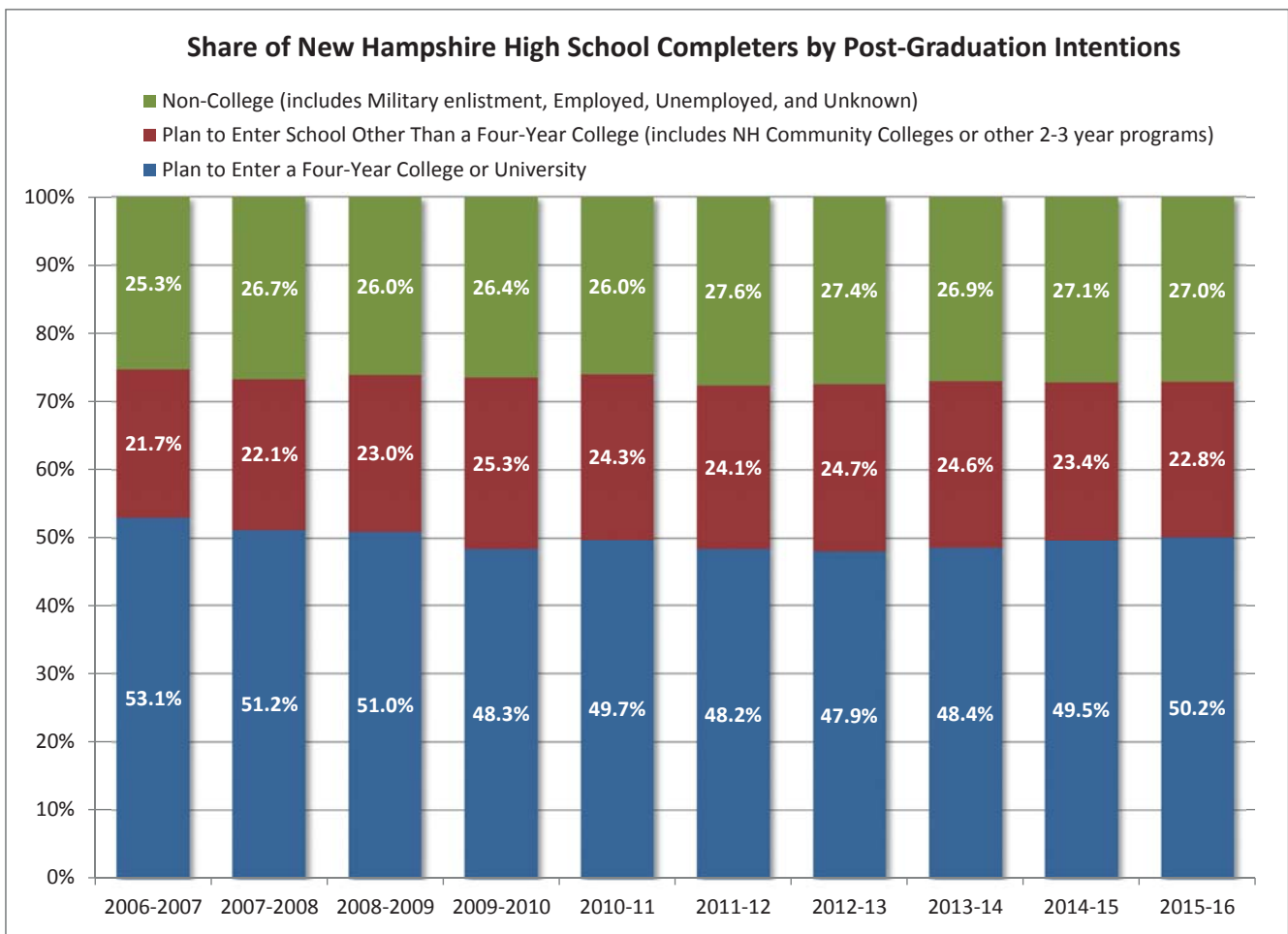
²⁴ The Status of Higher Education in New Hampshire, Division of Higher Education – Higher Education Commission, New Hampshire Department of Education, December 2016, p.10. Accessed on March 30, 2017 at www.education.nh.gov/highered/research/documents/status-report.pdf

This inflow and outflow of college bound population creates a positive dynamic for the economy as it promotes talent intermingling, encouraging the interchange of ideas. A consistent outpour of potential talent could be devastating for the state’s future workforce.

The educational attainment of the future workforce can be impacted by two strategies:

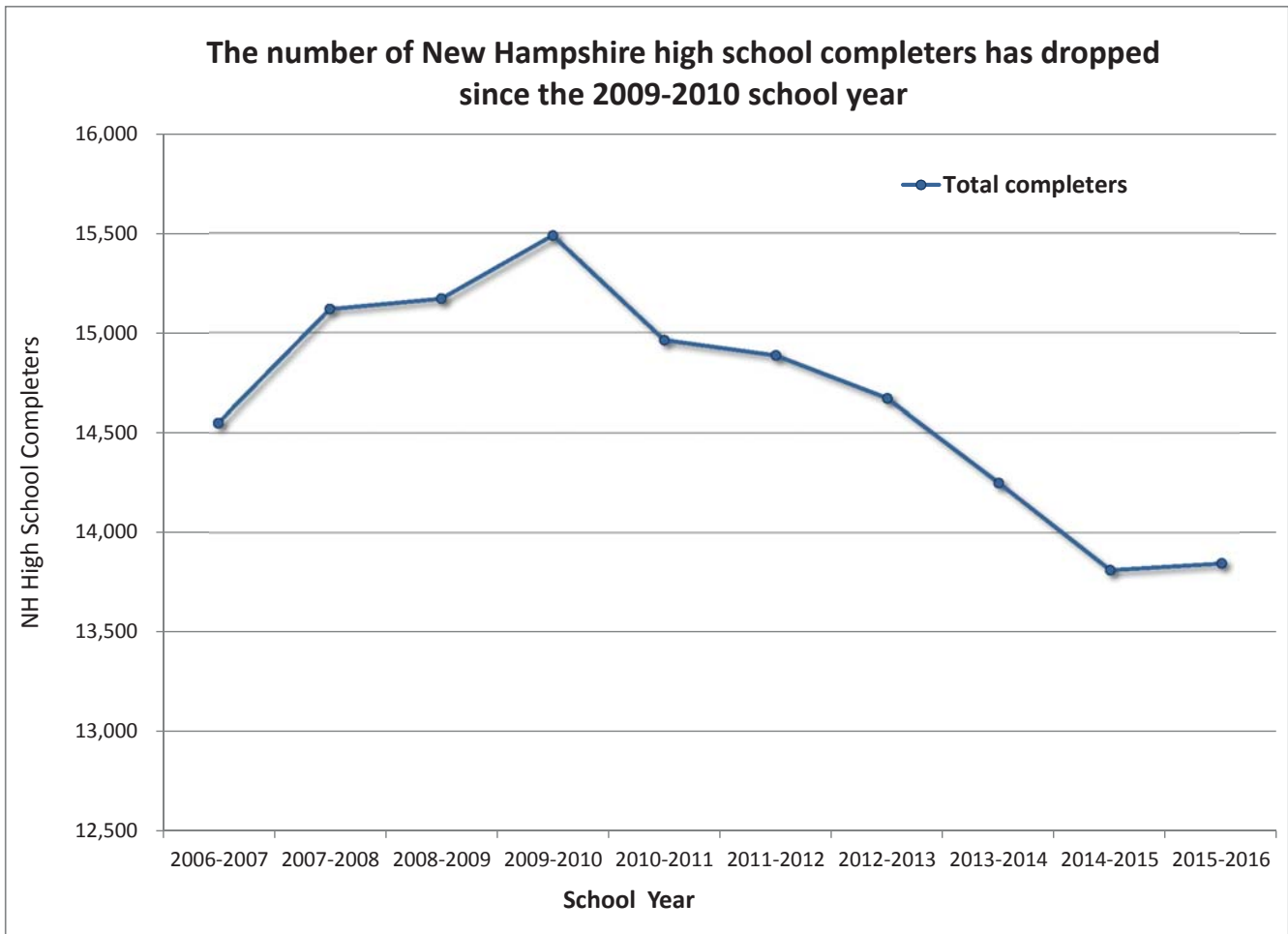
- One is to retain more of the students that came from other states to stay in New Hampshire after graduation.
- The other is to regain some of the New Hampshire students that went out-of-state to attend college.

The share of high school students attending either a four-year college or other than a four-year postsecondary institution has been relatively steady over the last ten years. The share of high school completers entering a four-year college or university declined over the last ten years, from 53.1 percent in 2006-2007 to 50.2 percent in 2015-2016. The share of students entering a two-or three- year college increased slightly, from 21.7 percent to 22.8 percent. Combined, the share of high school completers that entered some kind of postsecondary institution remained higher than 72 percent in the period between 2006-2007 and 2015-2016.



Source: 2005 - 2015 State total completers by category, New Hampshire Department of Education, Division of Program Support - Bureau of Data Management. <https://www.education.nh.gov/data/dropouts htm#complete>

The number of high school completers, though, in New Hampshire has been dropping — by 10.6 percent over the last six years. The decline in high school completers is derived from a reduction in New Hampshire’s school age population in general and is not due to an increase in the dropout rate. There are just fewer children in New Hampshire.²⁵



Source: 2005 - 2015 State total completers by category, New Hampshire Department of Education, Division of Program Support - Bureau of Data Management. <https://www.education.nh.gov/data/dropouts.htm#complete>

The share of New Hampshire’s high school students going out of state to attend college has remained the same over the last ten years – so the “flight of young talent” is not a new phenomenon. This means that despite the state’s relative strength in encouraging the high school population to transition into postsecondary pathways, two out of five pursue an educational path outside New Hampshire. That, combined with a decline in the number of high school completers in New Hampshire, means that the state cannot solely rely on high school completers as the talent pipeline. The state needs to pay closer attention to the older population that has yet not achieved a postsecondary level of educational attainment.

²⁵ According to Census population estimates, there were 325,802 persons under age 20 in 2010, in comparison to 301,754 in 2015.

The above data on high school completers is only an indication of where the New Hampshire high school graduates start out. Some postsecondary students transfer to other schools and some do not complete college. Fortunately, New Hampshire four-year public colleges have the second highest college completion rates in the nation, at 90.2 percent for full-time students.²⁶ Still, about one in five of New Hampshire's residents has attained *Some college, no degree*, but has not completed a college degree.

There is, therefore, room for some creative thinking to find new ways to connect persons with *Some college, no degree* with New Hampshire's postsecondary institutions. Converting prior credits obtained into partial degrees or assessing life and work experience in lieu of classroom studies could help these individuals back on a pathway to completing an Associate's degree or a high-value certification.

²⁶ The Status of Higher Education in New Hampshire, Division of Higher Education – Higher Education Commission, New Hampshire Department of Education. Op. cit., p. 10.

Comparing Worker Education to Job Expectations

How does the educational attainment of the current workforce compare to the level of education expected by employers? To help answer this question, the current educational attainment of workers in middle education occupations, based on the U.S. Census Bureau's Equal Employment Opportunity (EEO) tabulation for New Hampshire, was compared to the preferred level of education for those same occupations found in online job ads.

Author: Anita Josten, Research Analyst

New Hampshire's adult population is well-educated. Among residents age 18 and over, 63 percent have completed some postsecondary education. Compared to other states and the District of Columbia, the share of New Hampshire residents age 18 and over completing any postsecondary education ranked 11th highest.²⁷ Roughly 60 percent of New Hampshire residents age 18 years and older had attained at least a high school diploma up to some college or an Associate's degree. Compared to other states, the share of residents with this level of education in New Hampshire ranked 35th.

How does the educational attainment of those currently in the workforce compare to the education required for advertised jobs? By comparing the educational attainment of workers by occupation to preferred level of education in job ads, the potential need for improvement in educational attainment can be assessed.

Assessment of current worker educational attainment compared to educational requirements of jobs

To compare worker educational attainment to the education preferred by employers, three data sources were used. First, middle education occupations were selected based on the education, related work experience, and post-hire training values established by the U.S. Bureau of Labor Statistics to identify typical preparation for entry-level employment. The selected occupations were then compared the U.S. Census Bureau's Equal Employment Opportunity (EEO) Tabulation for New Hampshire, which was used as a proxy for occupational employment by educational attainment. The EEO tabulation estimates the number of workers by educational attainment for occupations. Finally, using Labor/Insight, Burning Glass Technologies, available online job postings were evaluated for the same selected occupations to identify employers' preferred level of education for job applicants.

This comparison provides an assessment of the differences between worker educational attainment and employer preferences for job applicants in middle education occupations.

²⁷ 2011-2015 American Community Survey 5-Year Estimates, Table S1501: EDUCATIONAL ATTAINMENT

Education and Training Comparison Methodology

“Middle education” occupations have been defined as those occupations with entry-level educational requirements of at least a high school diploma or equivalent, plus related experience and/or at least one year of on-the-job training, but less than a four-year degree. Based on the Standard Occupational Classification (SOC), the Bureau of Labor Statistics (BLS) produces occupational data, which includes education and related work experience required for entry-level employment in the occupation, as well as post-hire training needed to achieve competency. For each occupation, the BLS assigns one of eight educational attainment levels, one of three types of related work experience, and one of six post-hire training levels.

Education and Training Categories		
Education	Experience	Training
Less than high school	Less than five years	Internship or residency
High school diploma or equivalent (GED)	Five years or more	Apprenticeship
Some College, no degree	None	Long-term on-the-job training
Postsecondary non-degree award		Moderate-term on-the-job training
Associate's degree		Short-term on-the-job training
Bachelor's Degree		None
Master's Degree		
Doctoral (PhD) or professional degree		

Source: Bureau of Labor Statistics

The Equal Employment Opportunity (EEO) tabulation from the U.S. Census Bureau was developed to measure diversity in the labor force. The tabulation utilizes an occupational classification similar to, but less detailed than, the SOC. Additionally, the educational attainment of workers in the EEO tabulation combines some educational categories that are detailed separately in the BLS data. The EEO data only assess worker educational attainment and do not assess on-the-job training or related experience.

Middle education occupations were selected based on entry-level educational and training requirements established by the BLS. For a complete list of middle education occupations, see Appendix B on page 83. Occupations meeting the criteria of middle education occupations were extracted from the EEO tabulation for analysis. One of the challenges of this assessment was that some EEO occupation codes combined several occupations into the same group. This presented some difficulty when one occupational code in the EEO tabulation included multiple SOC occupations with different levels of entry-level education. These groups were excluded from the analysis to avoid over-stating the educational attainment of workers in some EEO occupations. A complete comparison of occupations classified by EEO code versus SOC code that were excluded from analysis is listed in Table 1 at the end of the section on page 45.

In other cases, the EEO occupational code included multiple SOC occupations with the same entry-level education, and was included in the analysis. Comparison of the EEO code versus SOC code in these groups is listed in Table 2 at the end of the section on page 47.

Worker counts in the EEO data were summed for EEO occupations in the same education and training category. Percentages were based on the total number of workers within each education and training group.

To compare the educational attainment of workers to employer expectations of worker education, New Hampshire online job ads for the 12-month period of April 2016 to March 2017 were extracted from Labor/Insight, Burning Glass Technologies. In an effort to keep the occupational content consistent between the sources, selected job ads were for the same occupations used from the EEO tabulations. The same methodology of eliminating occupation groups that included occupations with multiple levels of education was used. Percentages were based on the total number of corresponding online job ads extracted.

The EEO Tabulation is a custom sum of data from the 2006-2010 American Community Survey 5-Year Estimates, conducted by the U.S. Census Bureau. Data include civilians employed at work who are 16 years of age and over. In the EEO Tabulation, detailed occupations may be collapsed as a method of disclosure avoidance.

EEO tabulations were produced as part of the 2006-2010 American Community Survey 5-Year Estimates. Source tables include:

- S1501: EDUCATIONAL ATTAINMENT 2011-2015 American Community Survey 5-Year Estimates
Population age 18 and over
- EEO-ALL08W-Geography-New Hampshire Estimate-Estimate: EEO 8w. Detailed Census Occupation by . . .
Educational Attainment (5), Sex, and Race/Ethnicity for Worksite Geography, Total Population-Universe: . .
Civilians employed at work 16 years and over
- EEO 9w. Detailed Census Occupation by Educational Attainment (6), Sex, and Race/Ethnicity for
Worksite Geography, Total Population Universe: Civilians employed at work 16 years and over

High School Diploma or Equivalent plus Related Work Experience

Occupations in this group typically require a high school diploma or equivalent plus work experience in a related occupation for entry-level employment. Most occupations in this category are either first-line supervisors or managers; the difference between them is that first-line supervisors usually have work experience and perform activities similar to those of the workers they supervise, while managers are primarily engaged in planning and directing, but also may supervise.²⁸

Based on the EEO tabulation for New Hampshire, there were roughly 58,900 workers in these occupations. The largest share of workers, 37 percent, had attained some college or an Associate’s degree, a higher level of education than typically required for entry-level employment. About 33 percent of employment was workers with a high school diploma. Those who had attained a Bachelor’s degree represented 20 percent of employment, and four percent held a graduate or professional degree.

Online job ads for these occupations from August 2016 to July 2017 were plentiful. Expected minimum education information was included in about half of the 5,700 online job ads.²⁹ Among ads including a minimum level of education, 27 percent specified at least a high school diploma or vocational training.

A Bachelor’s degree or higher education was specified in 18 percent of job ads, just over seven percent specified some college or an Associate’s degree, and less than one percent of ads specified a graduate degree.

Just under half of these online job postings included an experience preference. Around 27 percent of job ads specified between zero and two years of experience, which is less than entry-level experience cited by the BLS.

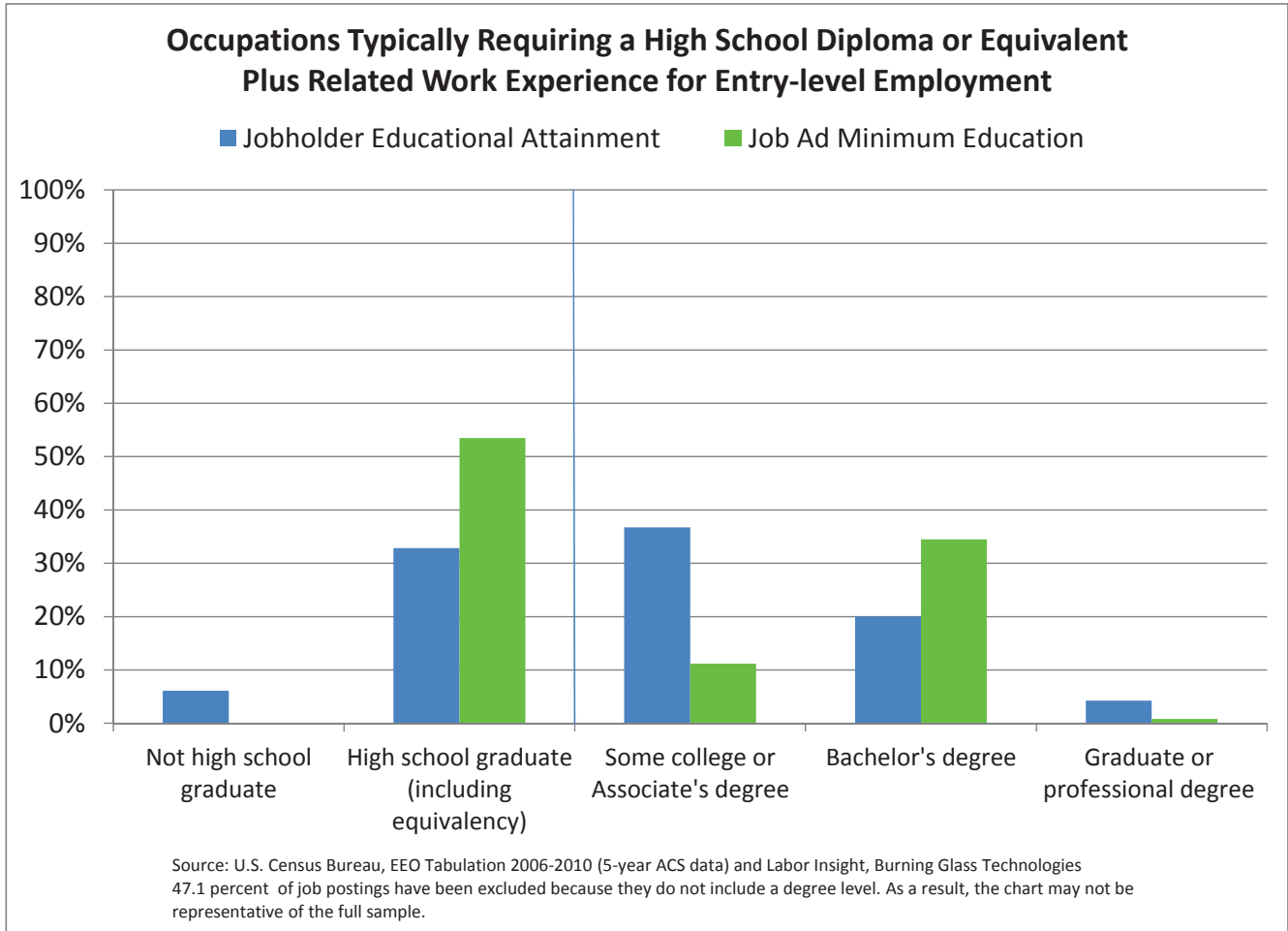
Entry-level Education: High school or equivalent: No training specified
Five or More Years of Related Work Experience
Transportation, storage, and distribution managers
Farmers, ranchers, and other agricultural managers
First-line supervisors of construction trades and extraction workers
Chefs and head cooks
Up to Five Years of Related Work Experience
Food service managers
Gaming managers
Lodging managers
Property, real estate, and community association managers
First-line supervisors of protective service workers, all other
First-line supervisors of food preparation and serving workers
First-line supervisors of housekeeping and janitorial workers
First-line supervisors of landscaping, lawn service, and groundskeeping workers
First-line supervisors of gaming workers ²
First-line supervisors of personal service workers
First-line supervisors of retail sales workers
First-line supervisors of non-retail sales workers
First-line supervisors of office and administrative support workers
First-line supervisors of farming, fishing, and forestry workers
First-line supervisors of mechanics, installers, and repairers
First-line supervisors of production and operating workers
Supervisors of transportation and material moving workers ²
Executive secretaries and executive administrative assistants ¹
Real estate brokers and sales agents ¹
Self-enrichment education teachers ³

¹ Occupations are combined with other occupations in the EEO tabulation. The occupations in the group have different minimum educational requirements, therefore, were excluded from the total EEO employment and online job postings assessment. See Table 1 at the end of the section for details.

² Occupations are combined with other occupations in the EEO tabulation. For detailed list

²⁸ U.S. Bureau of Labor Statistics, SOC 2010 User Guide, ppxii. <https://www.bls.gov/soc/#materials>

²⁹ All online job ads are for New Hampshire, from April 2016 to March 2017. Source: Labor/Insight, Burning Glass Technologies.



High School Diploma or Equivalent, Related Work Experience, and Moderate-Term On-the-Job Training

Occupations in this group require a high school diploma, one to 12 months of combined on-the-job experience and informal training, and related work experience of either up to five years or five years or more. Skills learned in on-the-job training are mostly transferable skills associated with the occupation, as opposed to job specific.³⁰ This education and training group includes occupations such as heavy machinery operators, crime investigators, and flight attendants.

Based on the EEO tabulation, slightly more than 2,400 individuals were employed in these occupations in New Hampshire. Almost one-quarter of individuals held the entry-level education of a high school diploma. The largest share of individuals working in these jobs, over 40 percent, had some college or an Associate’s degree. Another 30 percent had attained a Bachelor’s degree or higher education.

Just over one-third of the 234 jobs ads from August 2016 through July 2017 included a preferred level of education from the employer. More than half of job ads including an educational preference specified a Bachelor’s degree or higher, while just over 30 percent indicated a high school diploma or vocational training.

Most job ads indicated a preference for more than the entry-level education cited by the BLS, and may indicate a mismatch between the educational levels for which employers advertise compared to typical entry-level education identified by the BLS. Employers may have difficulty filling these positions if expecting workers to have this level of educational attainment.

Among job ads including a preferred experience level, 31 percent of job ads specified zero to two years of experience, and 42 percent specified three to five years of experience, both within the entry-level experience range identified by the BLS.

Entry-level Education: High school or equivalent plus Moderate-term on-the-job training
Up to Five Years of Related Work Experience
First-line supervisors of correctional officers
First-line supervisors of police and detectives
Detectives and criminal investigators
Private detectives and investigators
Forest fire inspectors and prevention specialists ¹
Flight attendants
Locomotive engineers and operators ²
Crane and tower operators
Dredge, excavating, and loading machine operators ²
Postmasters and mail superintendents ³
Five or More Years of Related Work Experience
Construction and building inspectors

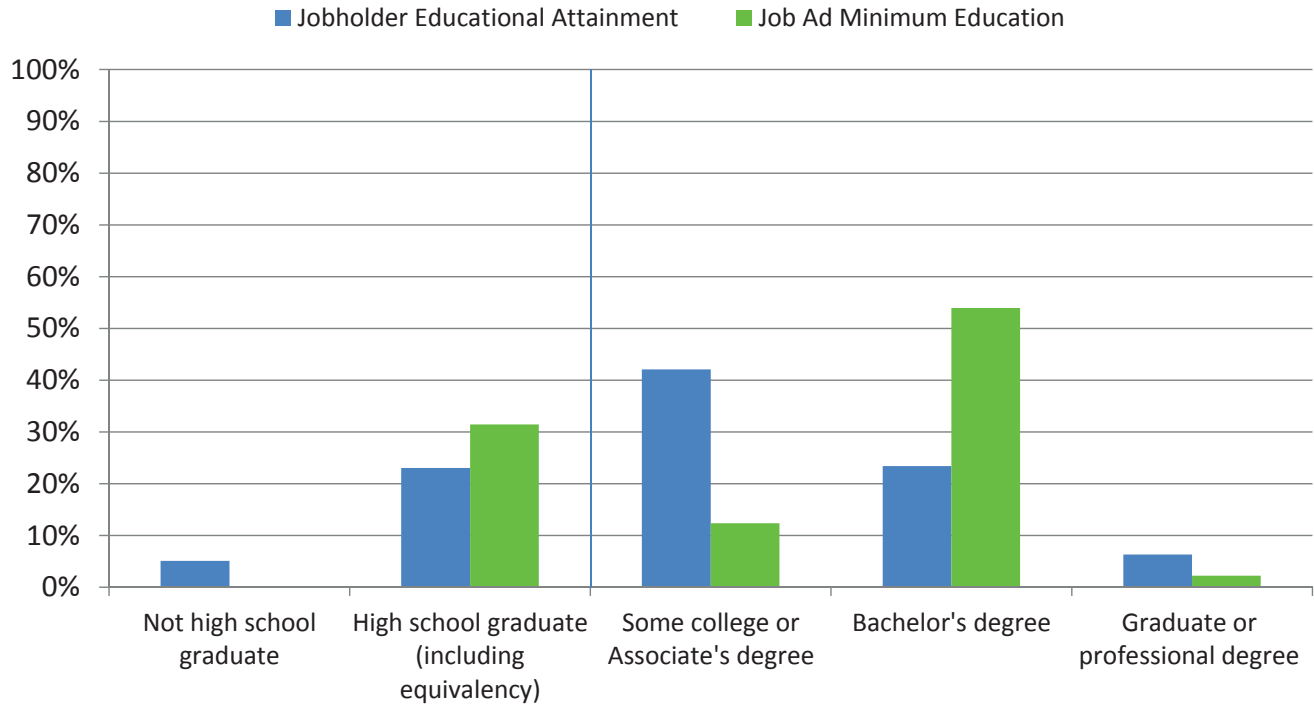
¹ Occupations are combined with other occupations in the EEO tabulation. The occupations in the group have different minimum educational requirements, therefore, were excluded from the total EEO employment and online job postings assessment. See Table 1 at the end of the section for details.

² Occupations are combined with other occupations in the EEO tabulation. For detailed list of occupations in the combinations, see Table 2 at the end of this section.

³ Occupations not listed separately in the EEO tabulation.

³⁰ U.S. Bureau of Labor Statistics, Employment Projections Occupational Data Definitions. https://www.bls.gov/emp/ep_nem_definitions.htm#education.

Occupations Typically Requiring a High School Diploma or Equivalent Plus Related Work Experience and Moderate OJT for Entry-level Employment



Source: U.S. Census Bureau, EEO Tabulation 2006-2010 (5-year ACS data) and Labor Insight, Burning Glass Technologies
 65.8 percent of job postings have been excluded because they do not include a degree level. As a result, the chart may not be representative of the full sample.

High School Diploma or Equivalent and Long-Term On-the-Job Training

Occupations in this category require a high school diploma or equivalent and long-term on-the-job training. Long-term on-the-job training is more than 12 months of on-the-job training or, alternatively, combined work experience and formal classroom instruction, to develop the skills needed to attain competency.³¹ Job families in this group include installation, maintenance, and repair and production occupations, along with dispensing opticians and photographers.

Based on the EEO tabulation for New Hampshire, over 13,200 individuals were employed in these occupations. Half of these individuals matched the entry-level educational attainment requirements of a high school diploma, while roughly one-third had some college or an Associate’s degree.

Less than half, 43 percent, of the 1,893 online job ads for these occupations from August 2016 through July 2017 included an educational preference. By far, most employers specified education in line with the entry-level requirements of the occupations identified by the BLS, with almost 90 percent of all job ads specifying a high school education.

An experience level was included in almost 52 percent of job ads. The largest portion, over 47 percent of those ads, specified between zero and two years — roughly in line with the BLS entry-level experience. Another 42 percent of ads specified between three and five years of experience.

Entry-level Education:
High school or equivalent: No experience specified
Long-term on-the-job training
Claims adjusters, appraisers, examiners, and investigators ¹
Industrial and refractory machinery mechanics ¹
Photographers
Opticians, dispensing
Automotive body and related repairers
Bus and truck mechanics and diesel engine specialists
Heavy vehicle and mobile equipment service technicians and mechanics ²
Maintenance and repair workers, general
Electrical power-line installers and repairers
Computer numerically controlled machine tool programmers, metal and
Telecommunications line installers and repairers
Locksmiths and safe repairers
Machinists
Tool and die makers
Power plant operators, distributors, and dispatchers ²
Stationary engineers and boiler operators
Water and wastewater treatment plant and system operators
Miscellaneous plant and system operators ²
Jewelers and precious stone and metal workers
Motorboat mechanics and service technicians ³
Recreational vehicle service technicians ¹
Precision instrument and equipment repairers, all other ¹
Molders, shapers, and casters, except metal and plastic

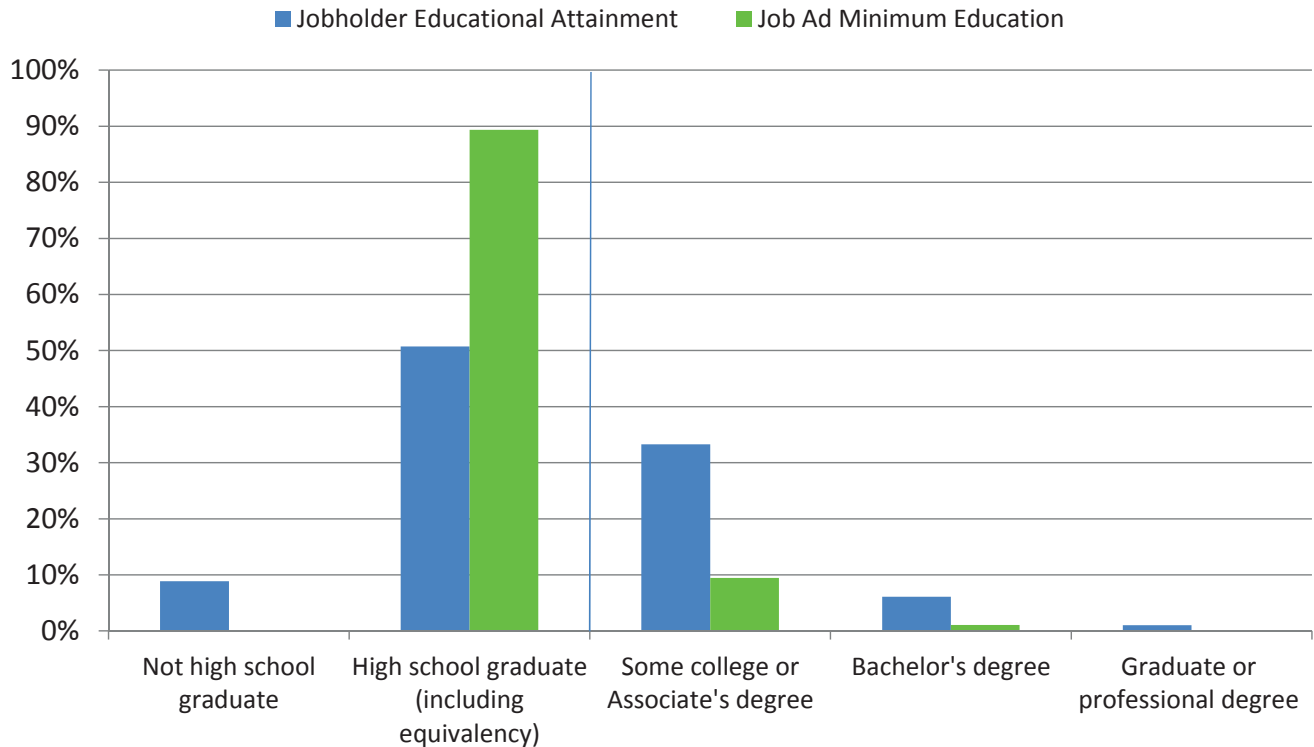
¹ Occupations are combined with other occupations in the EEO tabulation. The occupations in the group have different minimum educational requirements, therefore, were excluded from the total EEO employment and online job postings assessment. See Table 1 at the end of the section for details.

² Occupations are combined with other occupations in the EEO tabulation. For detailed list of occupations in the combinations, see Table 2 at the end of this section.

³ Occupations not listed separately in the EEO tabulation.

³¹ U.S. Bureau of Labor Statistics, Employment Projections. op. cit.

Occupations Typically Requiring a High School Diploma or Equivalent Plus Long-Term OJT for Entry-level Employment



Source: U.S. Census Bureau, EEO Tabulation 2006-2010 (5-year ACS data) and Labor Insight, Burning Glass Technologies
 57.0 percent of job postings have been excluded because they do not include a degree level. As a result, the chart may not be representative of the full sample.

High School Diploma or Equivalent and Apprenticeship

An apprenticeship is a formal relationship between a worker and sponsor that consists of a combination of on-the-job training and related occupation-specific technical instruction in which the worker learns the practical and theoretical aspects of an occupation while earning wages. The typical apprenticeship program provides at least 144 hours of occupation-specific technical instruction and 2,000 hours of on-the-job training per year, over a three- to five-year period.³² Nine of the ten occupations in this training category are construction and extraction jobs and one is an installation, maintenance, and repair occupation.

The EEO tabulation estimated there were about 13,900 individuals working in occupations that usually require an apprenticeship. Roughly 47 percent of individuals in these occupations held a high school diploma, the typical entry-level educational attainment, and 33.4 percent had some college or an Associate’s degree.

There were 593 online job ads for these occupations from August 2016 through July 2017. Employers included a preference for level of education in 16 percent of those ads. The educational level included in job ads for these occupations matched the entry-level educational requirement for the occupation.

Employers included an experience preference in over 37 percent of job ads. Three to five years of experience was specified in almost 53 percent of ads, and zero to two years’ experience was specified in 40 percent.

Entry-level Education:
High school or equivalent: No experience specified
Apprenticeship
Pipelayers, plumbers, pipefitters, and steamfitters ¹
Boilermakers
Brickmasons, blockmasons, and stonemasons ²
Carpenters
Electricians
Glaziers
Reinforcing iron and rebar workers
Sheet metal workers
Structural iron and steel workers
Elevator installers and repairers
Millwrights
Musical instrument repairers and tuners ³

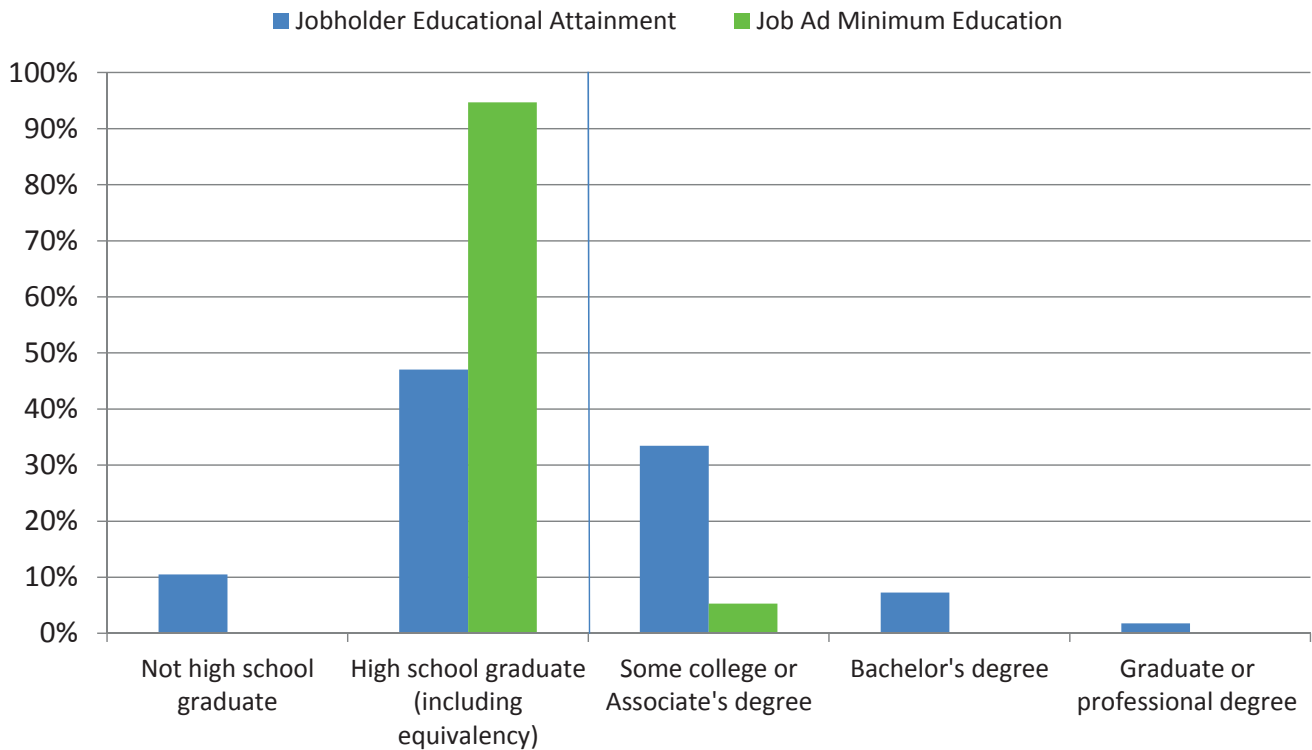
¹ Occupations are combined with other occupations in the EEO tabulation. The occupations in the group have different minimum educational requirements, therefore, were excluded from the total EEO employment and online job postings assessment. See Table 1 at the end of the section for details.

² Occupations are combined with other occupations in the EEO tabulation. For detailed list of occupations in the combinations, see Table 2 at the end of this section.

³ Occupations not listed separately in the EEO tabulation.

³² U.S. Bureau of Labor Statistics, Employment Projections. op. cit.

Occupations Typically Requiring a High School Diploma or Equivalent Plus an Apprenticeship for Entry-level Employment



Source: U.S. Census Bureau, EEO Tabulation 2006-2010 (5-year ACS data) and Labor Insight, Burning Glass Technologies
 84.4 percent of job postings have been excluded because they do not include a degree level. As a result, the chart may not be representative of the full sample.

Postsecondary Certificate

Postsecondary non-degree award programs lead to a certificate or other award, but not a degree. The certificate is awarded by the educational institution and is the result of completing formal postsecondary schooling. Certification issued by a professional organization or certifying body is not included here. Some postsecondary non-degree award programs last only a few weeks, while others may last one to two years.³³ There is a variety of occupations in this educational category, with occupations in fields such as healthcare and personal services.

Based on the EEO tabulation, there were more than 14,500 individuals working in occupations requiring this level of education. Roughly one-third of individuals matched the entry-level requirement of a high school diploma. Over half of individuals working in these occupations had some college or an Associate’s degree.

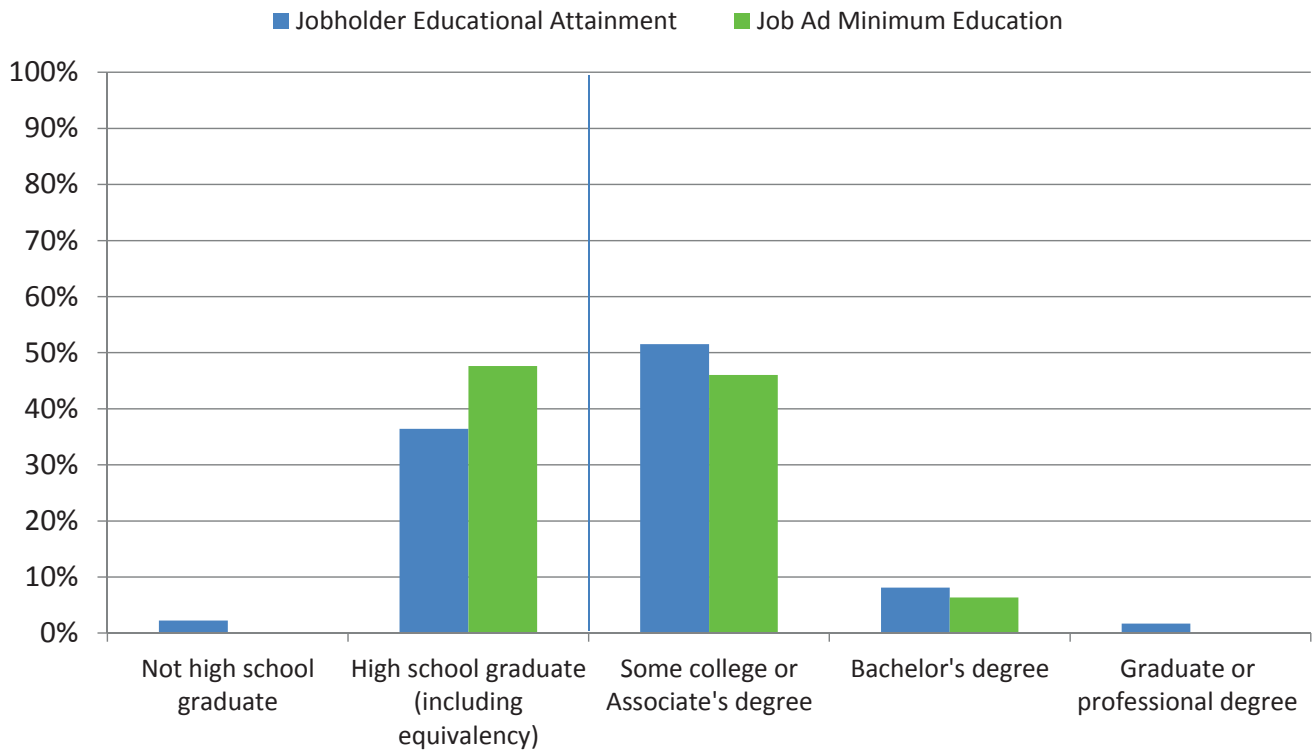
There were around 2,900 online job postings for occupations in this educational category from August 2016 through July 2017. Slightly more than one-quarter of these job ads included an educational preference from the employer. Almost 48 percent of ads included a preference for high school or vocational training, while 46 percent stated a preference for some college or an Associate’s degree.

In almost half the job ads, 46 percent, a preferred experience level was specified. Almost 72 percent of job ads for these occupations specified zero to two years’ experience, and 27 percent specified three to five years of experience.

Entry-level Education: Postsecondary certificate; No work experience specified
No work experience or training specified
Library technicians
Emergency medical technicians and paramedics
Licensed practical and licensed vocational nurses
Medical records and health information technicians
Massage therapists
Dental assistants
Medical assistants
Medical transcriptionists
Phlebotomists
Barbers
Hairdressers, hairstylists, and cosmetologists
Aircraft mechanics and service technicians
Prepress technicians and workers

³³ U.S. Bureau of Labor Statistics, Employment Projections. op. cit.

Occupations Typically Requiring a Postsecondary Certificate for Entry-level Employment



Source: U.S. Census Bureau, EEO Tabulation 2006-2010 (5-year ACS data) and Labor Insight, Burning Glass Technologies
 72.4 percent of job postings have been excluded because they do not include a degree level. As a result, the chart may not be representative of the full sample.

Postsecondary Certificate and On-The-Job Training

Occupations in this category require a postsecondary certificate and either short-term (one month or less) or moderate-term (one to 12 months) of on-the-job training to attain competency in the occupation. Short-term on-the job training is informal, while moderate-term on-the job training can be a combination of on-the-job experience and informal training. Training is occupation-specific rather than job-specific; therefore, skills learned can be transferred to another job in the same occupation.³⁴

Based on the EEO tabulation, just over 4,900 people were working in occupations identified as requiring a postsecondary certificate and short-term on-the-job training. Occupations in the moderate-term training category were combined with other training categories in the EEO tabulation, and did not allow for specific numeric comparisons. Almost half of the individuals had a high school diploma, matching the entry-level educational level identified by the BLS. Another 40 percent of these individuals have some college or an Associate’s degree, or higher education.

There were online job postings from August 2016 through July 2017 for three of the four occupations in this category. Of the 225 job ads, 31 percent included an educational preference from the employer. The majority of job ads specified high school or vocational training, similar to entry-level educational level for the occupations identified by the BLS.

Experience requirements were included in almost 39 percent of these job ads. Roughly two-thirds of these ads specified between zero and two years of experience.

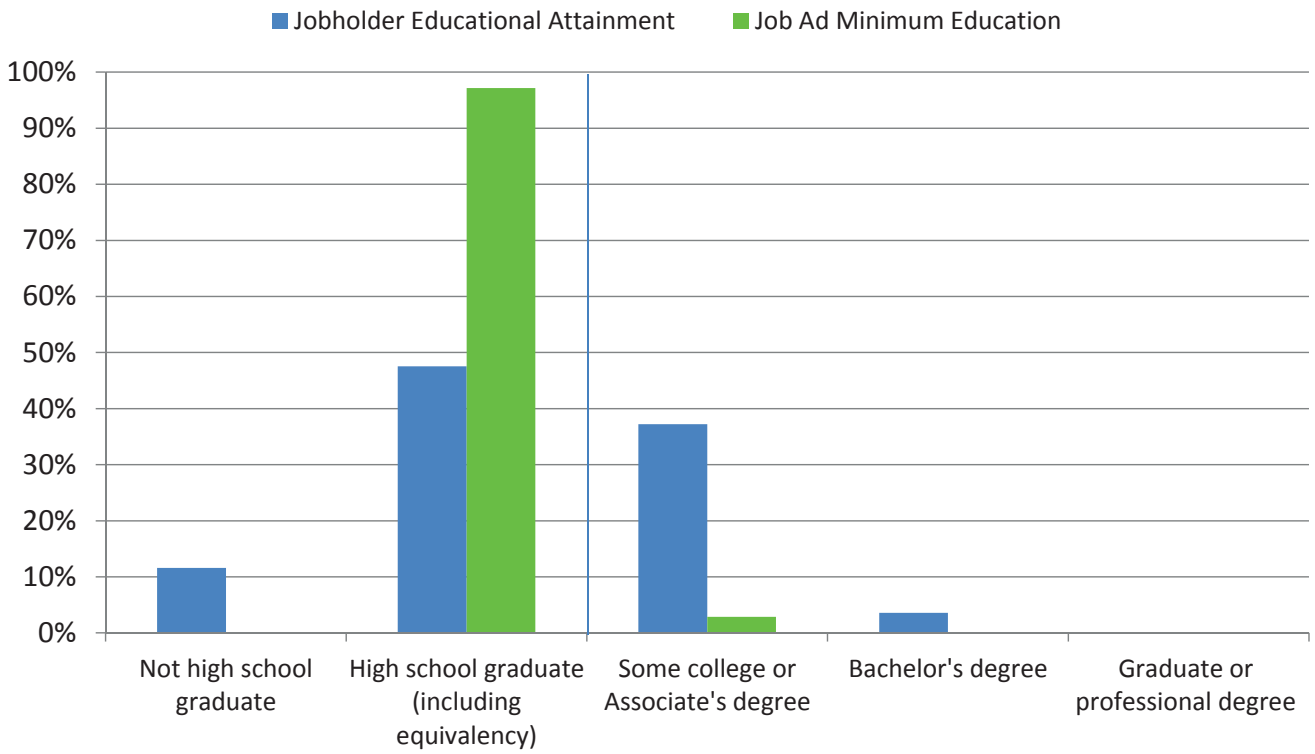
Entry-level Education:	
Postsecondary certificate; No work experience specified	
Short-term on-the-job training	
Electronic equipment installers and repairers, motor vehicles	
Electronic home entertainment equipment installers and repairers	
Embalmers and funeral attendants ¹	
Automotive service technicians and mechanics	
Heavy and tractor-trailer truck drivers ¹	
Motorcycle mechanics ¹	
Court reporters ³	
Audio and video equipment technicians ³	
Moderate-term on-the-job training	
Insurance appraisers, auto damage ¹	
Telecommunications equipment installers and repairers, except line installers ¹	
Commercial divers ¹	

¹ Occupations are combined with other occupations in the EEO tabulation. The occupations in the group have different minimum educational requirements, therefore, were excluded from the total EEO employment and online job postings assessment. See Table 1 at the end of the section for details.

³ Occupations not listed separately in the EEO tabulation.

³⁴ U.S. Bureau of Labor Statistics, Employment Projections. op. cit.

Occupations Typically Requiring a Postsecondary Certificate Plus Short-Term OJT for Entry-level Employment



Source: U.S. Census Bureau, EEO Tabulation 2006-2010 (5-year ACS data) and Labor Insight, Burning Glass Technologies
 61.5 percent of job postings have been excluded because they do not include a degree level. As a result, the chart may not be representative of the full sample.

Postsecondary Certificate and Long-Term On-The-Job Training

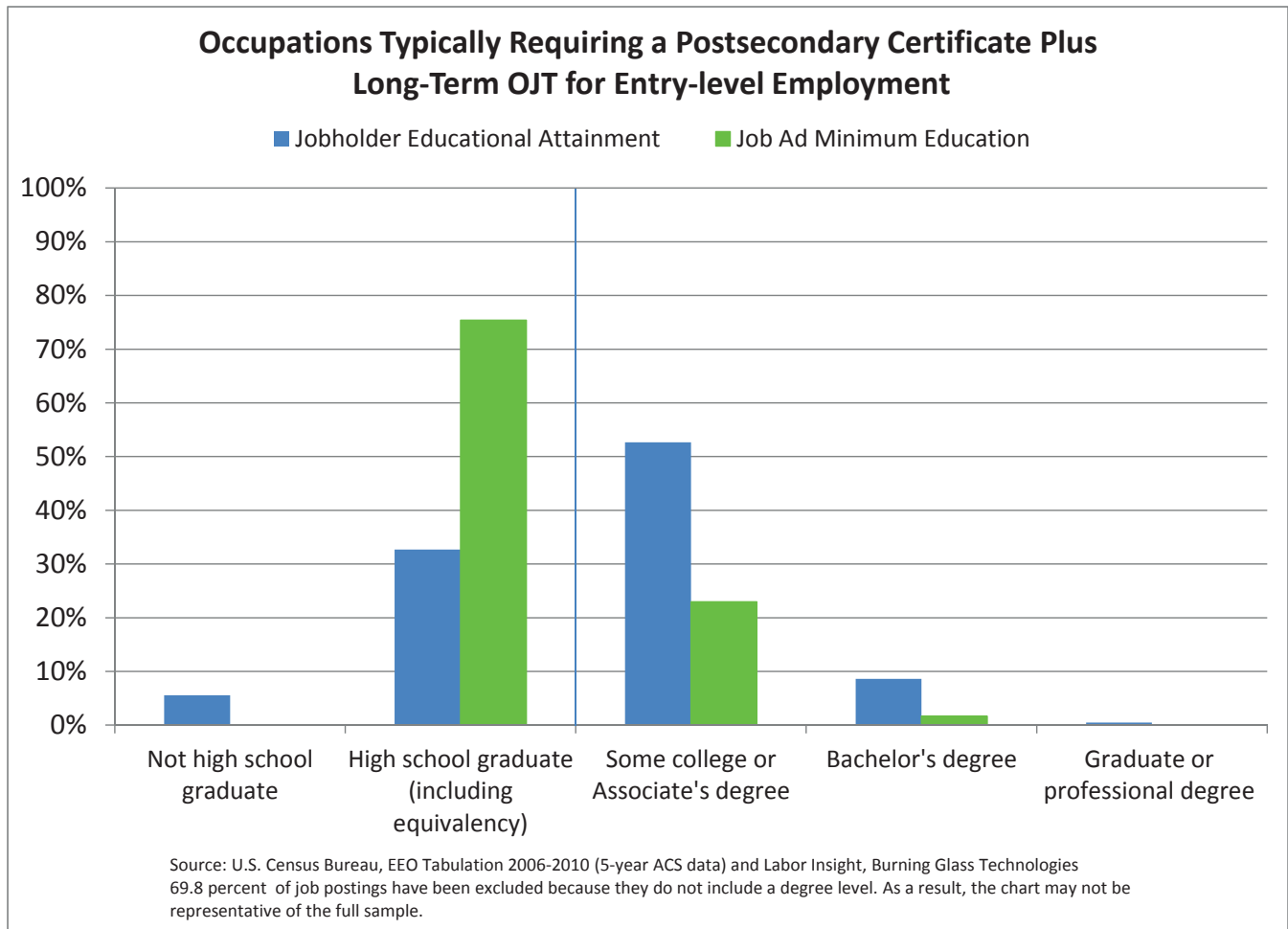
These occupations require a postsecondary non-degree certificate along with additional on-the-job training period of 12-months or more to become proficient in the job.

Based on the EEO tabulation for New Hampshire, almost 3,000 people worked in these occupations. Roughly one-third of these individuals had a high school diploma, while more than one-half of workers in these occupations had some college or an Associate's degree.

Of the 184 job ads from August 2016 through July 2017 for this group, about one-third specified an educational level. Over 75 percent of ads specified high school or vocational training. Experience was specified in 37 percent of job ads; 18 percent specified three to five years, while 12 percent specified two years or less.

Entry-level Education:	
Postsecondary certificate; No work experience specified	
Long-term on-the-job training	
Firefighters	
Electric motor, power tool, and related repairers	
Electrical and electronics repairers, transportation equipment, and industrial and utility ¹	
Heating, air conditioning, and refrigeration mechanics and installers	

¹ Occupations are combined with other occupations in the EEO tabulation. The occupations in the group have different minimum educational requirements, therefore, were excluded from the total EEO employment and online job postings assessment. See Table 1 at the end of the section for details.



Some College, No Degree or Associate's Degree

The *Some college, no degree* training category requires completion of some college coursework, while the *Associate's degree* category requires completion of college program at least two years in length. Occupations in both categories typically require different levels of on-the-job training to become proficient. While the EEO tabulation combines *Some college, no degree* with an *Associate's degree*, entry-level educational requirements identified by the BLS are more specific, and the two levels of educational attainment are separated. For this reason, these two levels of educational attainment are evaluated individually.

Some College and On-The-Job Training

Occupations in this education and training group require some college. Some college, no degree signifies the achievement of a high school diploma or equivalent plus the completion of one or more postsecondary courses that did not result in a degree or award.³⁵

Based on the EEO tabulation for New Hampshire, roughly 10,500 individuals were employed in occupations with an entry-level educational requirement of some college. About half of the people in these occupations, 49 percent, held a level educational attainment similar to the entry-level requirements of some college or an Associate's degree, while 26 percent had a high school diploma and 21 percent held a Bachelor's degree.

There were almost 1,170 online ads for jobs in this category from August 2016 through July 2017. An educational preference was included in roughly 29 percent of the ads. Over 37 percent of these ads specified high school or vocational training, which is lower than the BLS entry-level requirement. A Bachelor's degree was specified in 33 percent of ads, and an Associate's degree was specified in 28 percent of ads.

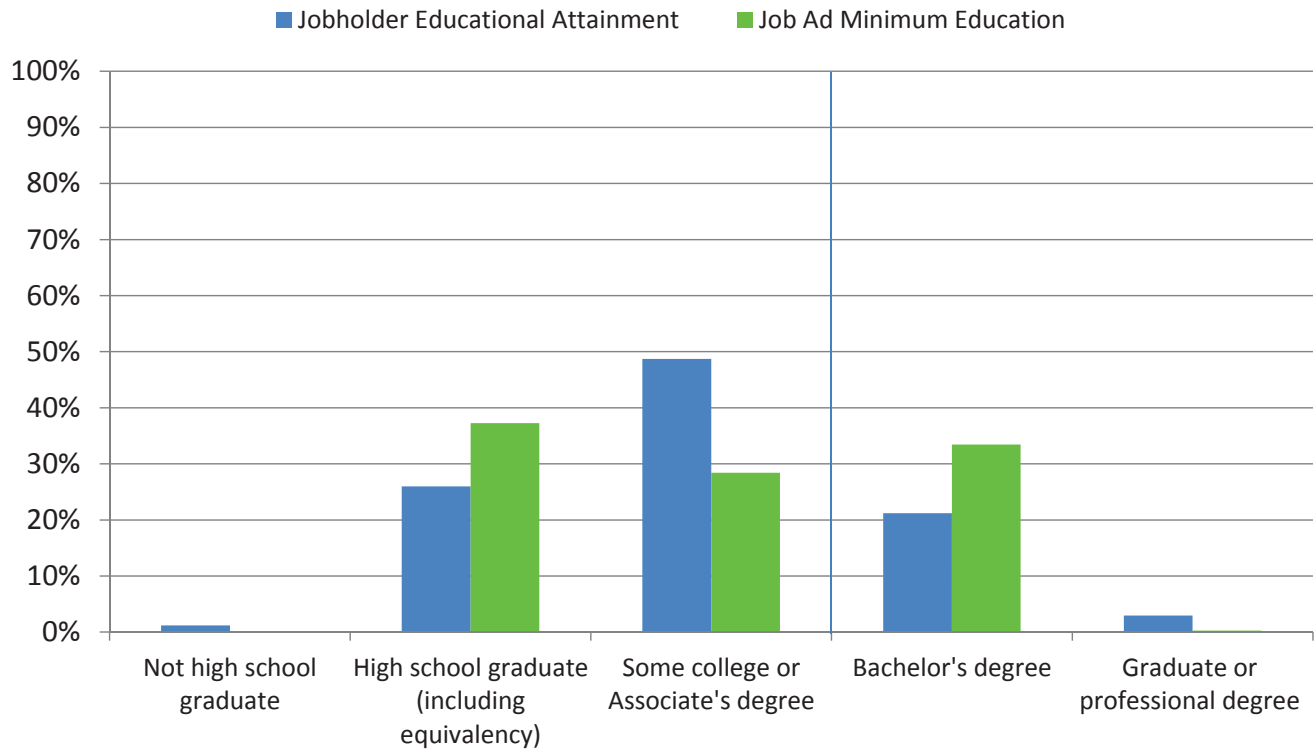
Entry-level Education: Some college; No work experience specified
Long-term on-the-job training
Actors
Moderate-term on-the-job training
Bookkeeping, accounting, and auditing clerks
Computer support specialists ¹
Short-term on-the-job training
Computer, automated teller, and office machine repairers
No training specified
Teacher assistants ³

¹ Occupations are combined with other occupations in the EEO tabulation. The occupations in the group have different minimum educational requirements, therefore, were excluded from the total EEO employment and online job postings assessment. See Table 1 at the end of the section for details.

³ Occupations not listed separately in the EEO tabulation.

³⁵ U.S. Bureau of Labor Statistics, Employment Projections. op. cit.

Occupations Typically Requiring Some College and OJT for Entry-level Employment



Source: U.S. Census Bureau, EEO Tabulation 2006-2010 (5-year ACS data) and Labor Insight, Burning Glass Technologies
 74.5 percent of job postings have been excluded because they do not include a degree level. As a result, the chart may not be representative of the full sample.

Associate's Degree

Occupations in this group typically require completion of an Associate's degree for entry-level employment. Completion of this degree usually means at least two years, but not more than four years, of full-time academic study beyond high school.³⁶

Based on the EEO tabulation for New Hampshire, there were more than 25,100 individuals working in occupations requiring an Associate's degree for entry-level employment. Almost half of the individuals employed in these jobs had some college or an Associate's degree, aligned with entry-level requirements. More than one-third of workers held a Bachelor's degree or higher; almost half of those with a Bachelor's degree were *Registered nurses*.

From August 2016 through July 2017 there were almost 14,500 online job ads for occupations with usual entry-level education of an Associate's degree. Over three-quarters of the ads specified a preference for level of education. Roughly 73 percent of employers preferred an Associate's degree, while another 17 percent specified a Bachelor's degree or higher, well above the typical entry level requirements.

More than half of the job ads, 59 percent, included a preference for experience. The majority of these ads, 83 percent, specified zero to two years of experience, and 15 percent specified three to five years.

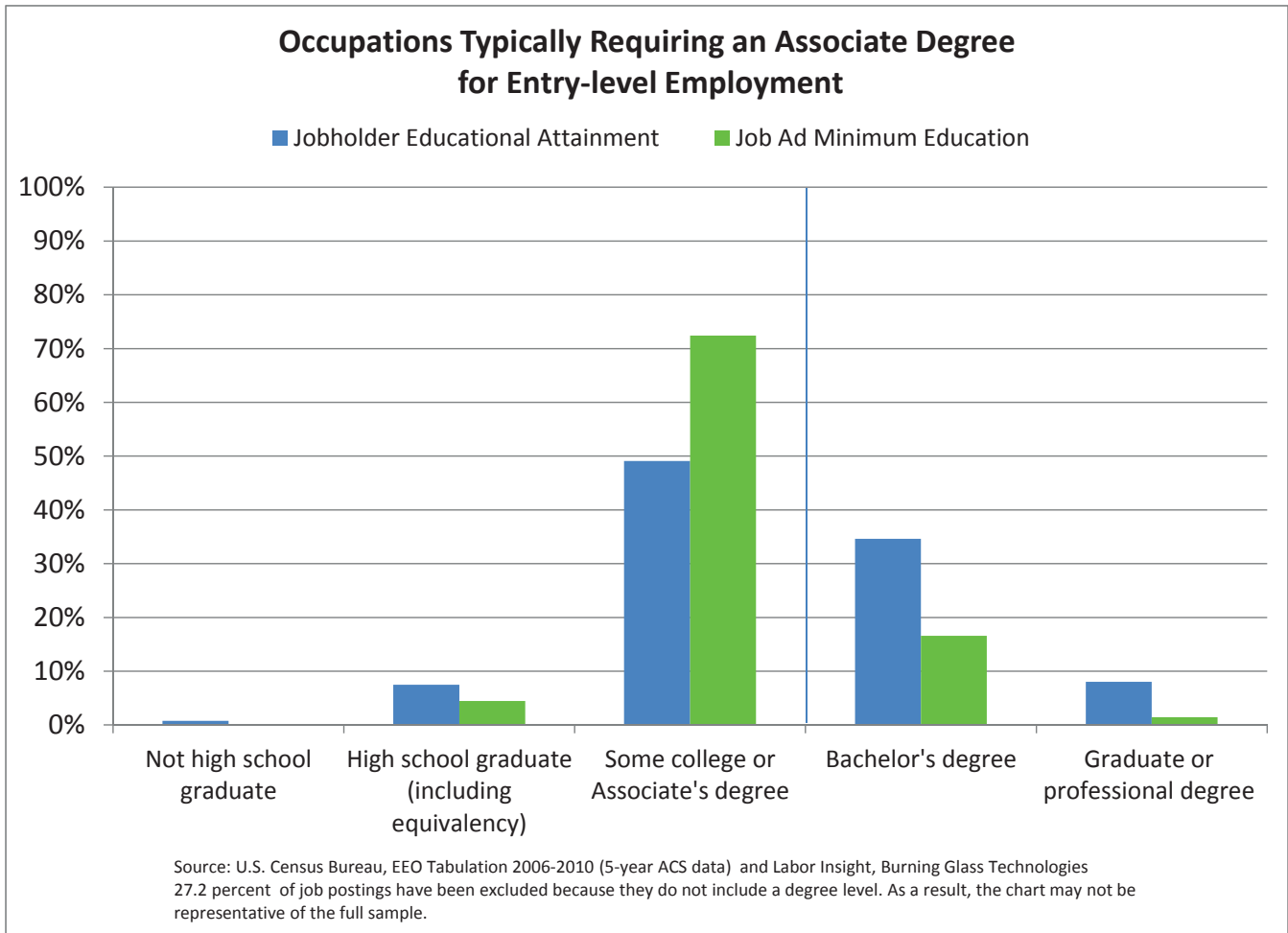
Entry-level Education: Associate's degree; No work experience specified	
Long-term on-the-job training	
Air traffic controllers ¹	
Morticians, undertakers, and funeral directors	
Geological and petroleum technicians ³	
Moderate-term on-the-job training	
Agricultural and food science technicians	
Medical equipment repairers ¹	
Chemical technicians	
Short-term on-the-job training	
Desktop publishers ³	
Broadcast technicians ³	
No training specified	
Web developers	
Health practitioner support technologists and technicians ¹	
Avionics technicians	
Paralegals and legal assistants	
Human resources assistants, except payroll and timekeeping	
Radiation therapists	
Registered nurses	
Dental hygienists	
Preschool and kindergarten teachers ¹	
Occupational therapy assistants and aides ¹	
Physical therapist assistants and aides ¹	
Computer network support specialists ¹	
and freezing equipment operators ¹	
Drafters ²	
Engineering technicians, except drafters ²	
Diagnostic related technologists and technicians ²	
Environmental science and protection technicians, including health ³	
Medical and clinical laboratory technicians ³	
Forest and conservation technicians ³	
Life, physical, and social science technicians, all other ³	

¹ Occupations are combined with other occupations in the EEO tabulation. The occupations in the group have different minimum educational requirements, therefore, were excluded from the total EEO employment and online job postings assessment. See Table 1 at the end of the section for details.

² Occupations are combined with other occupations in the EEO tabulation. For detailed list of occupations in the combinations, see Table 2 at the end of this section.

³ Occupations not listed separately in the EEO tabulation.

³⁶ U.S. Bureau of Labor Statistics, Employment Projections. op. cit.



In Summary

Overall, these comparisons indicate that New Hampshire does have educated workers holding middle education jobs. These comparisons also help unveil where there are some mismatches of experience versus formal educational expectations of employers. Currently, the workforce in New Hampshire is aging, and with age comes experience, knowledge, and skill. However, as older workers start to leave the workforce, or change to less demanding jobs, employers face the challenge of trying to fill the void created by exiting older workers.

Perspectives on Middle Education Occupations in New Hampshire

Table 1

EEO Occupational Groups - Mixed Education Groups		Education/Experience/Training
EEO Group	EEO Group Title	
SOC 13-1030	Claims adjusters, appraisers, examiners, and investigators	
13-1031	Claims Adjusters, Examiners, and Investigators	High School None Long OJT
13-1032	Insurance Appraisers, Auto Damage	Postsecondary None Moderate OJT
SOC 15-1150	Computer support specialists	
15-1151	Computer User Support Specialists	Some College None None
15-1152	Computer Network Support Specialists	Associate's degree None None
SOC 25-2010	Preschool and kindergarten teachers	
25-2011	Preschool Teachers, Except Special Education	Associate's degree None None
25-2012	Kindergarten Teachers, Except Special Education	Bachelor's degree None Intern/Residency
SOC 29-2050	Health practitioner support technologists and technicians	
29-2051	Dietetic Technicians	Associate's degree None None
29-2052	Pharmacy Technicians	High School None Moderate OJT
29-2053	Psychiatric Technicians	Postsecondary < 5 years Short OJT
29-2054	Respiratory Therapy Technicians	Associate's degree None None
29-2055	Surgical Technologists	Postsecondary None None
29-2056	Veterinary Technologists and Technicians	Associate's degree None None
29-2057	Ophthalmic Medical Technicians	Postsecondary None None
SOC 31-1010	Nursing, psychiatric, and home health aides	
31-1011	Home Health Aides	None None Short OJT
31-1013	Psychiatric Aides	High School None Short OJT
31-1014	Nursing Assistants	Postsecondary None None
31-1015	Orderlies	High School None Short OJT
SOC 31-2010	Occupational therapy assistants and aides	
31-2011	Occupational Therapy Assistants	Associate's degree None None
31-2012	Occupational Therapy Aides	High School None Short OJT
SOC 31-2020	Physical therapist assistants and aides	
31-2021	Physical Therapy Assistants	Associate's degree None None
31-2022	Physical Therapist Aides	High School None None
SOC 33-2020	Fire inspectors	
33-2021	Fire Inspectors and Investigators	Postsecondary 5 + years Moderate OJT
33-2022	Forest Fire Inspectors and Prevention Specialists	High School < 5 years None
SOC 41-9020	Real estate brokers and sales agents	
41-9021	Real Estate Brokers	High School < 5 years None
41-9022	Real Estate Sales Agents	High School None Moderate OJT
SOC 43-6010	Secretaries and administrative assistants	
43-6011	Executive Secretaries and Executive Administrative Assistants	High School < 5 years None
43-6012	Legal Secretaries	High School None Moderate OJT
43-6013	Medical Secretaries	High School None Moderate OJT
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	High School None Short OJT
SOC 47-2150	Pipelayers, plumbers, pipefitters, and steamfitters	
47-2151	Pipelayers	None None Short OJT
47-2152	Plumbers, Pipefitters, and Steamfitters	High School None Apprenticeship
SOC 49-2020	Radio and telecommunications equipment installers and repairers	
49-2021	Radio, Cellular, and Tower Equipment Installers and Repairs	Associate none Moderate OJT
49-2022	Telecommunications Equipment Installers and Repairers, Except Line Installers	Postsecondary none Moderate OJT
SOC 49-209X	Electrical and electronics repairers, transportation equipment, and industrial and utility*	
49-2093	Electrical and Electronic Installers and Repairers, Transportation Equipment	Postsecondary None Long OJT
49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	Postsecondary None Long OJT
49-2095	Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	Postsecondary None Long OJT
49-2098	Security and Fire Alarm Systems Installers	High School None Moderate OJT
SOC 49-3050	Small engine mechanics	
49-3051	Motorboat Mechanics and Service Technicians	High School None Long OJT
49-3052	Motorcycle Mechanics	Postsecondary None Short OJT
49-3053	Outdoor Power Equipment and Other Small Engine Mechanics	High School None Moderate OJT

Shaded cells indicate occupations that do not match the educational attainment for middle-education jobs

* Other occupations (49-2091, 49-2092, 49-4096, and 49-2097) were listed separately

Perspectives on Middle Education Occupations in New Hampshire

Table 1 (continued)

EEO Occupational Groups - Mixed Education Groups (continued)		Education/Experience/Training
EEO Group	EEO Group Title	
SOC 49-3090 Miscellaneous vehicle and mobile equipment mechanics, installers, and repairers		
49-3091	Bicycle Repairers	High School None Moderate OJT
49-3092	Recreational Vehicle Service Technicians	High School None Long OJT
SOC 49-904X Industrial and refractory machinery mechanics**		
49-9033	Tire Repairers and Changers	High School None Short OJT
49-9041	Industrial Machinery Mechanics	High School None Long OJT
49-9043	Maintenance Workers, Machinery	High School None Moderate OJT
SOC 49-9060 Precision instrument and equipment repairers		
49-9062	Medical Equipment Repairers	High School None Moderate OJT
49-9063	Musical Instrument Repairers and Tuners	High School None Apprenticeship
49-9064	Watch Repairers	High School None Long OJT
49-9069	Precision Instrument and Equipment Repairers, All Other	High School None Long OJT
SOC 49-909X Other installation, maintenance, and repair workers, including wind turbine service technicians,		
49-9091	Coin, Vending, and Amusement Machine Servicers and Repairers	High School None Short OJT
49-9092	Commercial Divers	Postsecondary None None
49-9094	Locksmiths and Safe Repairers	High School None Long OJT
49-9095	Manufactured Building and Mobile Home Installers	High School < 5 years Short OJT
49-9096	Riggers	High School None Short OJT
49-9097	Signal and Track Switch Repairers	High School None Moderate OJT
49-9098	Helpers — Installation, Maintenance, and Repair Workers	High School None Short OJT
49-9099	Installation, Maintenance, and Repair Workers, All Other	High School None Moderate OJT
SOC 51-4010 Computer control programmers and operators		
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	High School None Moderate OJT
51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	High School None Long OJT
SOC 51-91XX Other production workers, including semiconductor processors and cooling and freezing equipment operators		
51-9111	Packaging and Filling Machine Operators and Tenders	High School None Moderate OJT
51-9121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	High School None Moderate OJT
51-9122	Painters, Transportation Equipment	High School None Moderate OJT
51-9123	Painting, Coating, and Decorating Workers	None None Moderate OJT
51-9141	Semiconductor Processors	Associate's degree None Long OJT
51-9151	Photographic Process Workers and Processing Machine Operators	High School None Short OJT
51-9191	Adhesive Bonding Machine Operators and Tenders	High School None Moderate OJT
51-9192	Cleaning, Washing, and Metal Picking Equipment Operators and Tenders	None None Moderate OJT
51-9193	Cooling and Freezing Equipment Operators and Tenders	High School None Moderate OJT
51-9194	Etchers and Engravers	High School None Moderate OJT
51-9195	Molders, Shapers, and Casters, Except Metal and Plastic	High School None Long OJT
51-9196	Paper Goods Machine Setters, Operators, and Tenders	High School None Moderate OJT
51-9197	Tire Builders	High School None Moderate OJT
51-9198	Helpers - Production Workers	High School None Short OJT
51-9199	Production Workers, All Other	High School None Moderate OJT
SOC 53-2020 Air traffic controllers and airfield operations specialists		
53-2021	Air Traffic Controllers	Associate's degree None Long OJT
53-2022	Airfield Operations Specialists	High School None Long OJT
SOC 53-3030 Driver/sales workers and truck drivers		
53-3031	Diver/Sales Worker	High School None Short OJT
53-3032	Heavy and Tractor-Trailer Truck Drivers	Postsecondary None Short OJT
53-3033	Light Truck or Delivery Services Drivers	High School None Short OJT

Shaded cells indicate occupations that do not match the educational attainment for middle-education jobs

** except Millwrights (49-9044) which are listed separately

Perspectives on Middle Education Occupations in New Hampshire

Table 2

EEO Occupational Groups - Same Education

EEO Group	EEO Group Title	Education/Experience/Training
SOC 17-3010 Drafters		
17-3011	Architectural and Civil Drafters	Associate's degree None None
17-3012	Electrical and Electronics Drafters	Associate's degree None None
17-3013	Mechanical Drafters	Associate's degree None None
17-3019	Drafters, All Other	Associate's degree None None
SOC 17-3020 Engineering technicians, except drafters		
17-3021	Aerospace Engineering and Operations Technicians	Associate's degree None None
17-3022	Civil Engineering Technicians	Associate's degree None None
17-3023	Electrical and Electronics Engineering Technicians	Associate's degree None None
17-3024	Electro-Mechanical Technicians	Associate's degree None None
17-3025	Environmental Engineering Technicians	Associate's degree None None
17-3026	Industrial Engineering Technicians	Associate's degree None None
17-3027	Mechanical Engineering Technicians	Associate's degree None None
17-3029	Engineering Technicians, Except Drafters, All Other	Associate's degree None None
SOC 29-2030 Diagnostic related technologists and technicians		
29-2031	Cardiovascular Technologists and Technicians	Associate's degree None None
29-3032	Diagnostic Medical Sonographers	Associate's degree None None
29-2033	Nuclear Medical Technicians	Associate's degree None None
29-2034	Radiologic Technologists	Associate's degree None None
29-2035	Magnetic Resonance Imaging Technologists	Associate's degree < 5 years None
SOC 39-1010 First-line supervisors of gaming workers		
39-1011	Gaming Supervisors	High School < 5 years None
SOC 47-2020 Brickmasons, blockmasons, and stonemasons		
47-2021	Brickmasons and Blockmasons	High School None Apprenticeship
47-2022	Stonemasons	High School None Apprenticeship
SOC 49-3040 Heavy vehicle and mobile equipment service technicians and mechanics		
49-3041	Farming Equipment Mechanics and Service Technicians	High School None Long OJT
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	High School None Long OJT
SOC 51-8010 Power plant operators, distributors, and dispatchers		
51-8011	Nuclear Power Reactor Operators	High School None Long OJT
51-8012	Power Distributors and Dispatchers	High School None Long OJT
51-8013	Power Plant Operators	High School None Long OJT
SOC 51-8090 Miscellaneous plant and system operators		
51-8091	Chemical Plant and Systems Operators	High School None Long OJT
51-8092	Gas Plant Operators	High School None Long OJT
51-8093	Petroleum Pump System Operators, Refinery Operators, and Gaugers	High School None Long OJT
51-8099	Plant and System Operators, All Other	High School None Long OJT
SOC 53-1000 Supervisors of transportation and material moving workers		
53-1011	Aircraft Cargo Handling Supervisors	High School < 5 years None
53-1021	First-line Supervisors of Helpers, Laborers, and Material Movers, Hand	High School < 5 years None
53-1031	First-line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	High School < 5 years None
SOC 53-4010 Locomotive engineers and operators		
53-4011	Locomotive Engineers	High School < 5 years Moderate OJT
SOC 53-5020 Ship and boat captains and operators		
53-5021	Captains, Mates, and Pilots of Water Vessels	Postsecondary < 5 years None
53-5022	Motorboat Operators	Postsecondary < 5 years None
SOC 53-7030 Dredge, excavating, and loading machine operators		
53-7032	Excavating and Loading Machine and Dragging Operators	High School < 5 years Moderate OJT

Workforce Upskilling - Fact or Myth?

Among employers and workforce professionals and strategists, there is a continuing discussion about the existence of a skills mismatch in the labor market. There can be large differences between the levels of skill that an employer wants workers to have, as opposed to what level of skill is required to do the job. In order to get a better understanding of what skills are required in a given occupation, in comparison to the level of the current workforce employed in the occupation, data on current occupational workforce by educational attainment was analyzed. In addition, a comparison was made of the educational and training entry requirements for the New Hampshire labor market between 2004 and 2014.

Author: *Annette Nielsen, Economist*

There is a strong sentiment among most economists that an increase in the educational attainment of the workforce will lead to productivity gain. Theoretically, that is a true assumption, but from a labor market perspective, there are several factors that might interfere with a perfect market. The largest obstacle is workforce specialization and matching skills gained with the demand for workers in the regional economy.

There was some evidence that during the Great Recession, with an elevated level of unemployment, employers were requiring a higher level of educational attainment than they might have under more normal economic conditions. This evidence was based on the minimum education companies specified in online job postings.³⁷ It is reasonable to believe that there are such swings in educational and skill requirements in response to the supply and demand of labor.

A broader analysis of the entry-level educational attainment required for different occupations compared to the level of educational attainment jobholders possess may be used to evaluate whether or not there has been an upward shift in educational expectations over time.

As part of employment projections, Bureau of Labor Statistics uses a three-pronged approach to define what is needed in order to enter a given occupation. This education and training classification system consists of three categories: 1) typical education needed for entry-level employment; 2) commonly required work experience in a related occupation; and 3) typical on-the-job training needed to obtain competency in the occupation.

When evaluating just the educational component of this three-pronged approach, it is important to point out the difference between how BLS defines the typical level of education that most workers need to enter the occupation as opposed to other educational attainment data by occupation, based on either American Community Survey (ACS) data or Current Population Survey (CPS) data. Data from the ACS and the CPS are an estimate of the level of educational attainment by all current jobholders age 25 and over, and not solely the new entrants to an occupation.

In general, there is a difference between the levels of education required for entry into a given occupation and what is the educational attainment of the jobholders in that given occupation. A classic example is the story of the New York cab driver that has a PhD in sociology. Is he overqualified for this job? Maybe, but what is important to the labor market is whether or not that worker is qualified for the job as taxi driver. Most commonly, no educational attainment is required for that job, though there may be some licensing requirements that have to be met. On the other hand, a taxi driver without a high school diploma will not qualify for a position as an associate professor in sociology. This is, of course, a rather obvious example, but for many occupations, especially in the middle-education section of the labor market, it is harder to exclusively discern the level of educational attainment required.

³⁷ Modestino, Alicia Sasser, et al. Upskilling: Do Employers Demand Greater Skill when Skilled Workers are plentiful? Federal Reserve Bank of Boston. Working papers No. 14-17. January 30, 2015.

In addition, there might be variation in qualification requirements between jobs within the same occupation. What is likely to drive such differences is the supply and demand in the regional economy as well as job market specialization.

Data from American Community Survey on the educational attainment for workers age 25 years and older by detailed occupation show that educational attainment can be higher — and in some cases, lower — than what is typically required for entry to an occupation.³⁸

ACS data on the actual education level of the current workforce (age 25 years and older) can be compared to the typical education required for entry to an occupation. The ACS data do not break out the entry level versus experienced level workers separately. For certain occupations, taking continuing education is required to maintain an occupational license. With longevity, it is not unusual that higher levels of education are pursued. This might, therefore, elevate the level of education possessed by experienced workers within an occupation as opposed to new entrants in the occupation.

The following charts illustrate the share of the workforce for specific occupations with level of educational attainment possessed by current workforce.

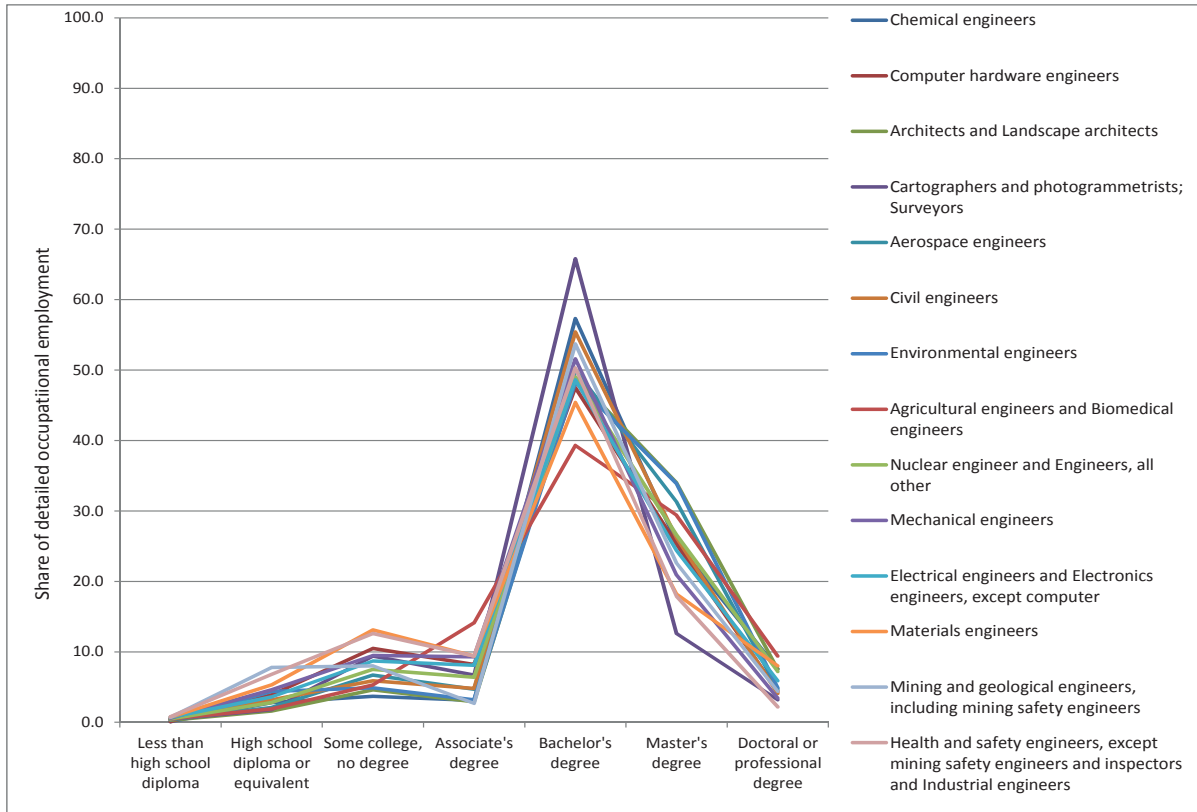
In those cases where an occupation typically requires a Bachelor's degree or higher as identified by the BLS, there is a pretty consistent picture of worker educational attainment. In contrast, for many of the middle education occupations, worker educational attainment is spread over a broader array of education levels.

The field of engineering provides a clear example of these differences. When comparing the educational attainment for workers in detailed engineering occupations, there is a sharp contrast between engineers and engineering technicians and drafters. Not only is a higher level of educational attainment required for engineers, the educational attainment is highly concentrated at the Bachelor's degree level or above, whereas for engineering technician occupations, the educational attainment is more equally distributed, ranging from a high school diploma to the baccalaureate level. According to the BLS designation of typical education at entry, all technicians and drafters require an Associate's degree, whereas the entry-level requirement for all engineer occupations is a Bachelor's degree.

³⁸ National data were used as educational attainment by detailed occupations would not be valid for the size of New Hampshire's workforce. A two-year average was used produce the educational attainment by individual occupation. Table 1.11 Educational attainments for workers 25 years and older by detailed occupation, 2014-15 was used for occupational comparison. Employment Projections program, U.S. Bureau of Labor Statistics.

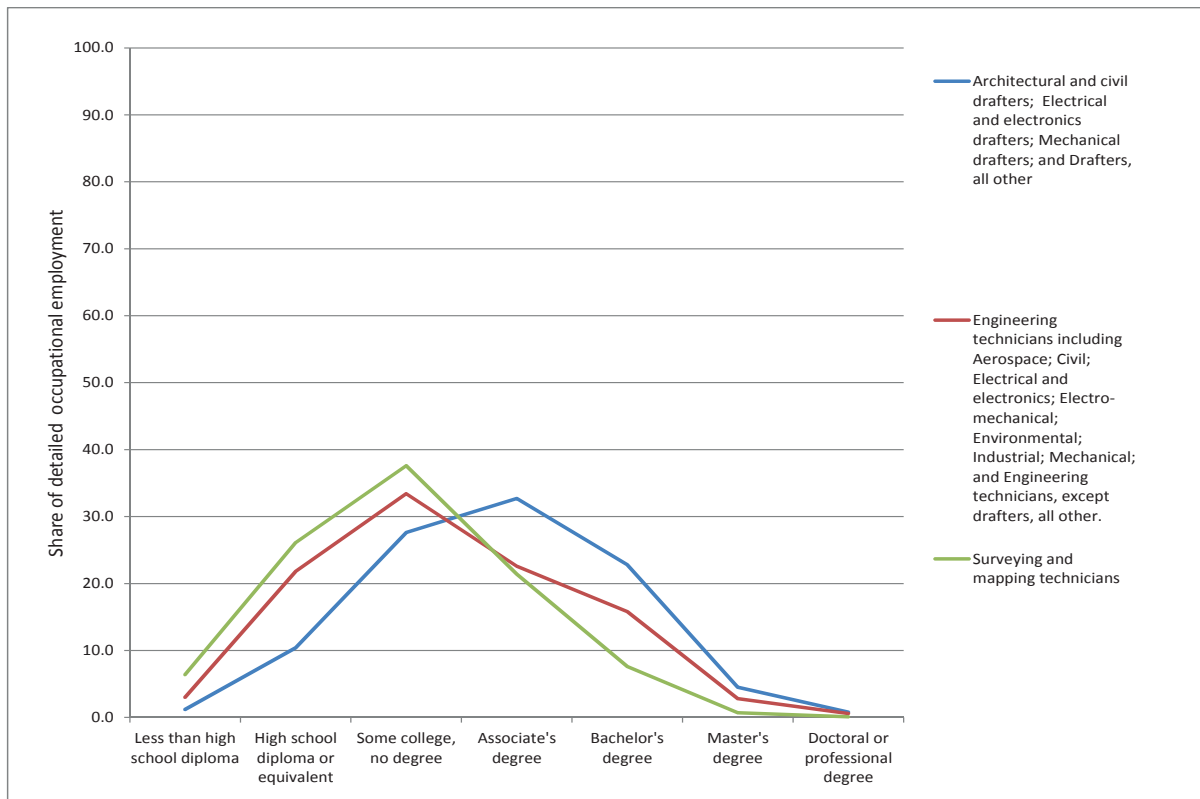
Data accessed on March 27, 2017 at https://www.bls.gov/emp/ep_table_111.htm. Data is based on 2014 and 2015 American Community Survey Public Use Microdata, U.S. Department of Commerce, U.S. Census Bureau.

Educational attainment of current workforce in engineering occupations



Source: 2014 and 2015 American Community Survey Public Use Microdata, U.S. Department of Commerce. U.S. Census Bureau

Educational attainment of current workforce for engineering technicians

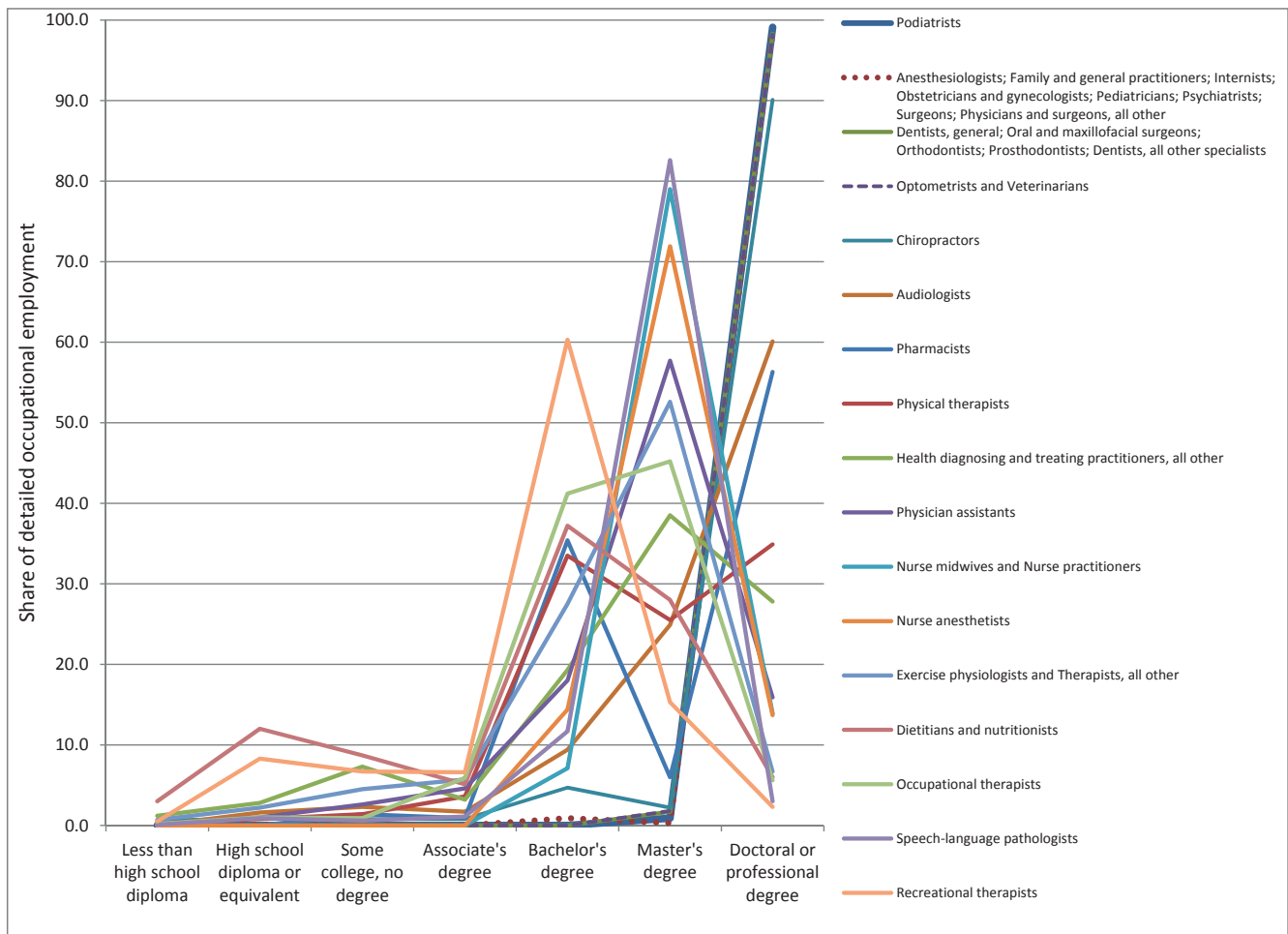


Source: 2014 and 2015 American Community Survey Public Use Microdata, U.S. Department of Commerce. U.S. Census Bureau

A similar picture emerges when comparing the educational attainment among *Healthcare practitioners* and *technical occupations*. Nearly all types of *Physicians and surgeons, Dentists, and Veterinarians* have attained a doctoral or professional degree; for most of the remaining occupations, it is fairly clear what level of educational attainment is required. BLS typical entry-level educational qualification reflects this consistency with usual entry-level educational attainment of either a doctorate or professional degree, or a Master's degree.

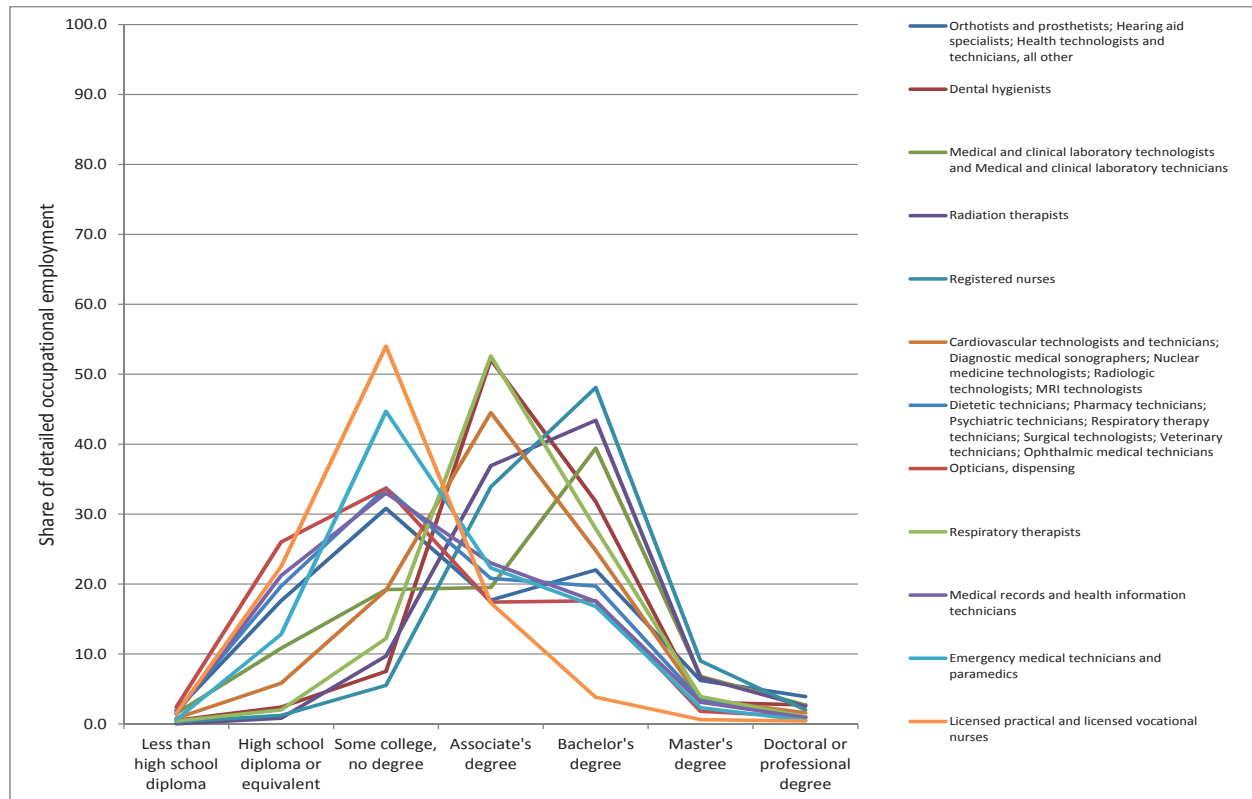
On the other hand, when examining middle education *Healthcare practitioners and technical occupations*, only a few occupations have a 50 percent or higher share of employment in the entry educational level, such as *Licensed practical and licensed vocational nurses, Dental hygienists, and Respiratory therapists*. More than half of *Licensed practical and licensed vocational nurses* have completed some college education without attaining a degree (Some college, no degree), whereas more than half of *Dental hygienists* and *Respiratory therapists* have attained an Associate's degree. Workers in other middle education occupations in this group have diverse levels of educational attainment, ranging from a high school diploma to a graduate degree.

Educational attainment of current workforce for healthcare practitioners



Source: 2014 and 2015 American Community Survey Public Use Microdata, U.S. Department of Commerce. U.S. Census Bureau

Educational attainment of current workforce for healthcare technicians



Source: 2014 and 2015 American Community Survey Public Use Microdata, U.S. Department of Commerce. U.S. Census Bureau

While there is little doubt about the qualification to become an engineer or a doctor, there is less consistency in the qualifications for middle education jobs. Some of the more clear-cut qualifications can be attributed to licensing requirements.³⁹ In New Hampshire, the licensing requirement for a Professional Engineer is a minimum of a Bachelor of Science degree, or the equivalent. Similarly, the New Hampshire licensing requirements for *Dentists* are a high school diploma, three or four years of college, graduation from a dental school general dentistry program of at least two years, and award of the degree of DMD (Doctor of Dental Medicine) or DDS (Doctor of Dental Surgery). Among healthcare practitioners, where licensing requirements are prevalent, some occupations may have a less clearly defined educational requirement. For example, the licensing requirement for a *Dental hygienist* in New Hampshire is a high school diploma and completion of an educational dental hygiene program of at least two years, which is usually equivalent to an Associate's degree. There are, however, educational institutions with dental hygiene programs that are longer than two years.

As illustrated above, there are differences in the level of education that workers possess within the same occupation. However, for occupations requiring either a Bachelor's or higher level of education as a minimum degree for entry, the level possessed by the workers in these occupations is very homogeneous. For the middle education occupations, the level of worker educational attainment varies to a greater extent, making it harder to indicate qualification for entry. As middle education occupations require less education to begin with, the potential for upskilling is more likely, especially as some tasks might be downshifted from those professional practitioners that require very high level of educational attainment.

³⁹ Licensure requirements can differ widely from state to state; the BLS designation of entry-level education is based on data from national sources.

Changes in the laws and administrative rules that govern licensed occupations can contribute to educational upskilling. In addition, other labor market factors may drive changes to entry-level educational requirements. Over time, there are two dynamics going on simultaneously that can impact upskilling:

- 1) One is changes in the job itself. As job tasks change over time, there might be an increased level of educational attainment required to do the job. Specialization and an increased level of job responsibilities can lead to a spin-off into a new occupation. *Nurse Anesthetist* is an example of an occupation for which an advanced degree certification was established on top of the educational requirements for a *Registered Nurse*.⁴⁰ The occupation of *Nurse Anesthetist* was added to the Standard Occupational Classification (SOC) taxonomy in 2010.
- 2) At the same time, the composition of the labor market is constantly changing. As industries grow and decline over time, some new jobs are created while others are eliminated. In the mix of the structural change of the labor market, jobs being added tend to require more education.

Has there been an upward shift in educational requirements over time?

In an attempt to evaluate if there has been inflation in the level of education typically required for entry to an occupation, two sets of long-term occupational projections were compared. The base year data from the 2004 to 2014 occupational projections were compared to base year data from the 2014 to 2024 occupational projections. This allows comparison of data from two different years, ten years apart. For this comparison, the major occupational groups were used instead of comparing employment change at the detailed occupational level. As mentioned earlier, new occupations emerge over time and some of these new occupations are broken apart from the original detailed occupation, which can eliminate the ability to make a strict comparison over time for a particular detailed occupation. The major occupational groups defined by the Standard Occupational Classification system have not changed over this ten-year period.⁴¹

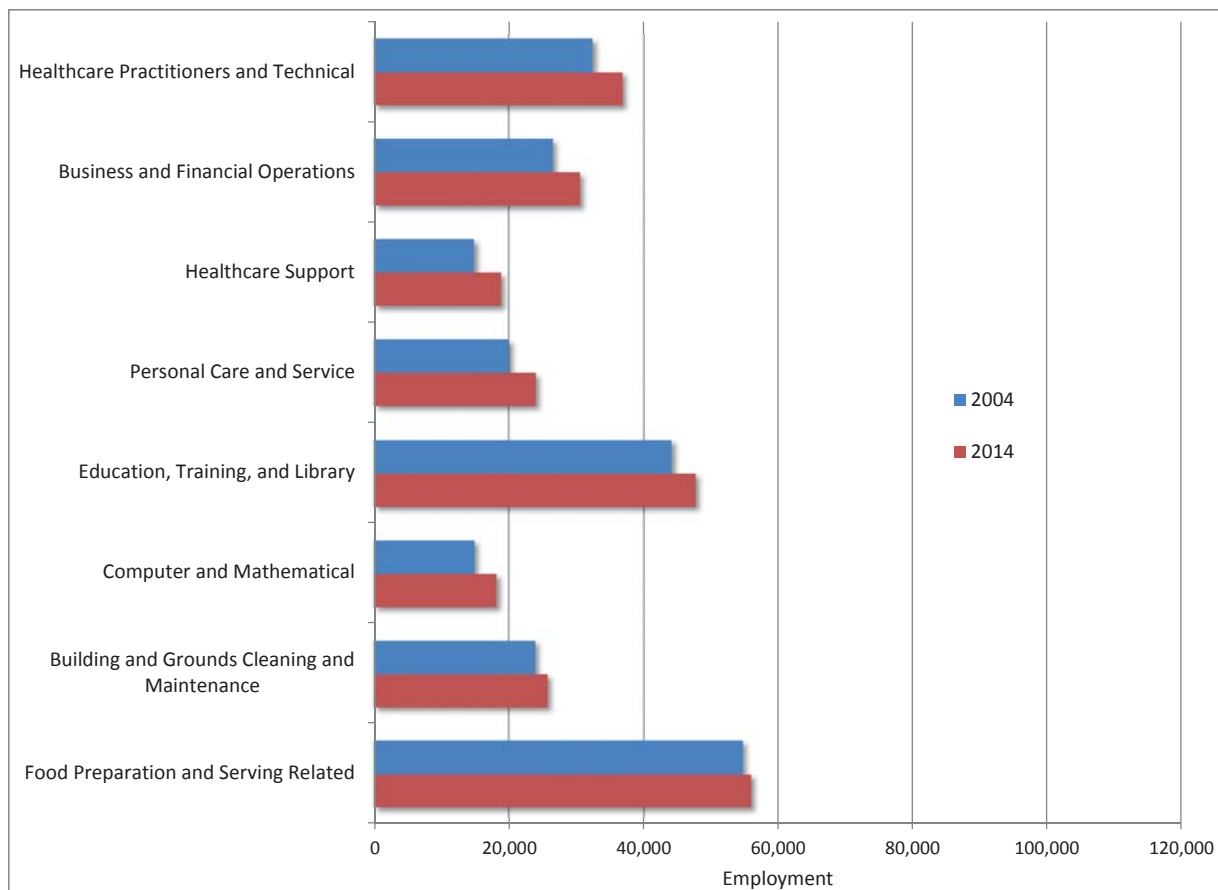
Over the last ten years, occupational upskilling has largely been impacted by the change in occupational composition, meaning the effects of job gains and losses in the major occupational groups. From the perspective of the major occupational group level, jobs in *Healthcare practitioners* and *technical occupations* and *Business and financial operations occupations* have been growing, whereas jobs have been lost in *Construction and extraction occupations*, *Sales and related occupations*, and *Production occupations*.

With few exceptions, *Healthcare practitioners and technical occupations* and *Business and financial operations occupations* require more than a high school diploma.⁴² Actually, the majority of occupations in these two groups require a Doctorate or professional degree, Master's degree, or Bachelor's degree. Examples of detailed occupations in these two major occupational groups are: *Surgeons*, *Physical therapists* and *Nurse practitioners*, as well as *Accountants*, *Management analysts*, and *Personal financial advisors*. There are, though, also many *Healthcare practitioners and technical occupations*, such as *Dental hygienists*, *Radiologic technologists*, and *Medical and clinical laboratory technologists*, that require an Associate's degree.

⁴⁰ American Association of Nurse Anesthetists, Become a CRNA. Accessed on March 15, 2017 on <http://www.aana.com/ceandeducation/becomeacrna/Pages/default.aspx>.

⁴¹ The occupational employment level is based on estimates derived from a survey (Occupational Employment Statistics) and there can be large variations from year to year. Using the employment level for the major occupational groups create a more robust comparison.

Major Occupational Groups with Growing Employment from 2004 to 2014



Source: 2014 and 2015 American Community Survey Public Use Microdata, U.S. Department of Commerce. U.S. Census Bureau

Conversely, among occupations in the three large declining major occupational groups, only a handful of jobs require a Bachelor’s degree or higher. *Production occupations* typically require a high school diploma and long or moderate on-the-job training. Examples of occupations that are still expected to grow in this major occupational group are *Machinists* and *Computer-controlled machine tool operators, metal and plastic*. *Construction and extraction occupations* typically require either a high school diploma and apprenticeship or no formal educational credential and only short- or moderate on-the-job training. Despite the decline in the occupational employment within this major occupational group, the outlook for *Electricians* and *Plumbers, pipefitters, and steamfitters* is very favorable — both occupations require completion of an apprenticeship.

In addition, for some of the other major occupational groups that gained employment over the last ten years, such as *Healthcare support occupations* and *Personal care and service occupations*, the educational attainment requirements for all occupations in the group are below the Bachelor’s degree level, yet some of these occupations require more than a high school diploma. Examples of growing occupations within these two major occupational groups are *Nursing assistants* and *Medical assistants*, as well as *Hairdressers, hairstylists, and cosmetologists*.

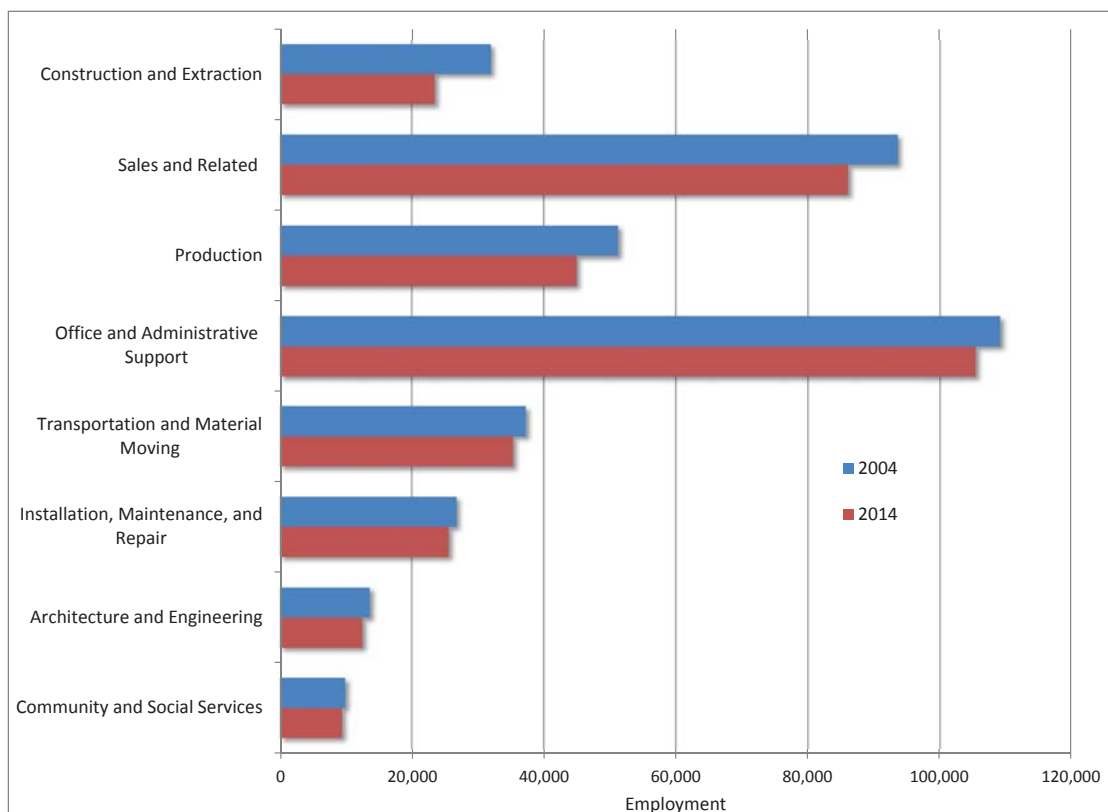
⁴² Bureau of Labor Statistics revised the Occupational Education and Training categories in 2010. From 1995 to 2008, a one-part, 11-category definition of education and training was used. This one-part definition was replaced with a three-pronged approach listing education, experience, and training in separate categories.

In broad terms, when comparing the occupational employment in 2004 with occupational employment in 2014, New Hampshire’s labor market has seen a net loss of approximately 30,000 jobs in occupations that do not require more than a high school diploma to enter. At the same time, occupations that typically require a Bachelor’s degree or above for entry-level employment gained more than 21,000 jobs. Due to changes in BLS’s methodology of how education and training requirements are categorized, a direct comparison of middle education occupations over time is not possible.⁴³ But as a rough estimate, there was an increase in jobs requiring a middle level of education over the ten-year period as well.

Over the ten-year period, there has been an upward movement in terms of the share of occupational employment typically requiring a Bachelor degree or above; however, it is a somewhat slow conversion, as the share of jobs typically requiring a Bachelor’s degree increased from 20.2 percent in 2004 to 23.5 percent in 2014.

Some would argue that the growth in certain high skill sectors would have been even stronger if qualified workforce had been available. But the supply and demand of workers in the labor market are in constant transformation. In addition, there is a potential looming retirement surge as the state’s workforce is aging, and as there are fewer younger workers in the pipeline. Promoting middle education jobs is an attempt at improving the level of workforce skills from the bottom up. It also fits into the framework of a constant need for upskilling the workforce. Building career pathways through jobs in middle education occupations will strengthen New Hampshire’s economy.

Major Occupational Groups with the Largest Employment Declines from 2004 to 2014



Source: 2014 and 2015 American Community Survey Public Use Microdata, U.S. Department of Commerce. U.S. Census Bureau

⁴³ As described in the prior footnote, Bureau of Labor Statistics changed the way it determined entry requirement for each detailed occupation. But evaluating the occupational requirement for jobs at the high school or below level and at the bachelor and above educational attainment level were comparable.

Apprenticeable Occupations - Exploring the Learning While Earning Model

The apprenticeship learn-as-you-earn model has been around for a long time, and is a viable option for more than half of the occupations defined as middle education. Explore how the apprenticeship model works, and how apprenticeship in New Hampshire has evolved over the last ten years.

Author: *Annette Nielsen, Economist*

Over the next ten years, an increasing number of workers will reach retirement age. Most employers are aware of the looming loss of skills-based and institutional knowledge. How will companies transfer knowledge and skills from the current workforce to the next generation of workers? Apprenticeship can help in recruiting, training, retraining, and retaining a quality workforce.

Apprenticeship is an earn-while-you-learn training model that benefits both employers and workers. Employers may use apprenticeship to train new workers or incumbent workers, providing a pipeline of workers with quality training specific to their business. Workers receive hands-on training, and are employed before starting their training, with pay from day one. Apprenticeship is a natural career pathway — as the apprentice continues to learn and expand their knowledge and ability, the rate of pay increases.

Apprenticeable Occupations

The Office of Apprenticeship, U.S. Department of Labor, annually publishes a List of Occupations Officially Recognized as Apprenticeable, which includes more than 1,300 individual occupational titles.⁴⁴ These occupational titles are classified using Registered Apprenticeship Partners Information Data System (RAPIDS) codes. In this list, RAPIDS codes are crosswalked to O*Net-SOC codes; many of the occupational titles fall within the same O*Net-SOC classification.⁴⁵ Using the O*Net-SOC code, the Standard Occupational Classification (SOC) may be identified.⁴⁶

Overall, there were 341 apprenticeable SOC occupations. In New Hampshire, out of the 769 occupations for which employment projections are available,⁴⁷ apprenticeship is a training option for 323 — about two out of every five. Among the 180 occupations defined as middle education, apprenticeship is a training option for 112 occupations — three out of every five. This shows a strong connection between middle education occupations and apprenticeship.

A majority of occupations on the official list are in one of three occupational groups:

- *Production occupations* (443 occupational titles),
- *Construction and extraction occupations* (249 occupational titles), and
- *Installation, maintenance, and repair occupations* (245 occupational titles).

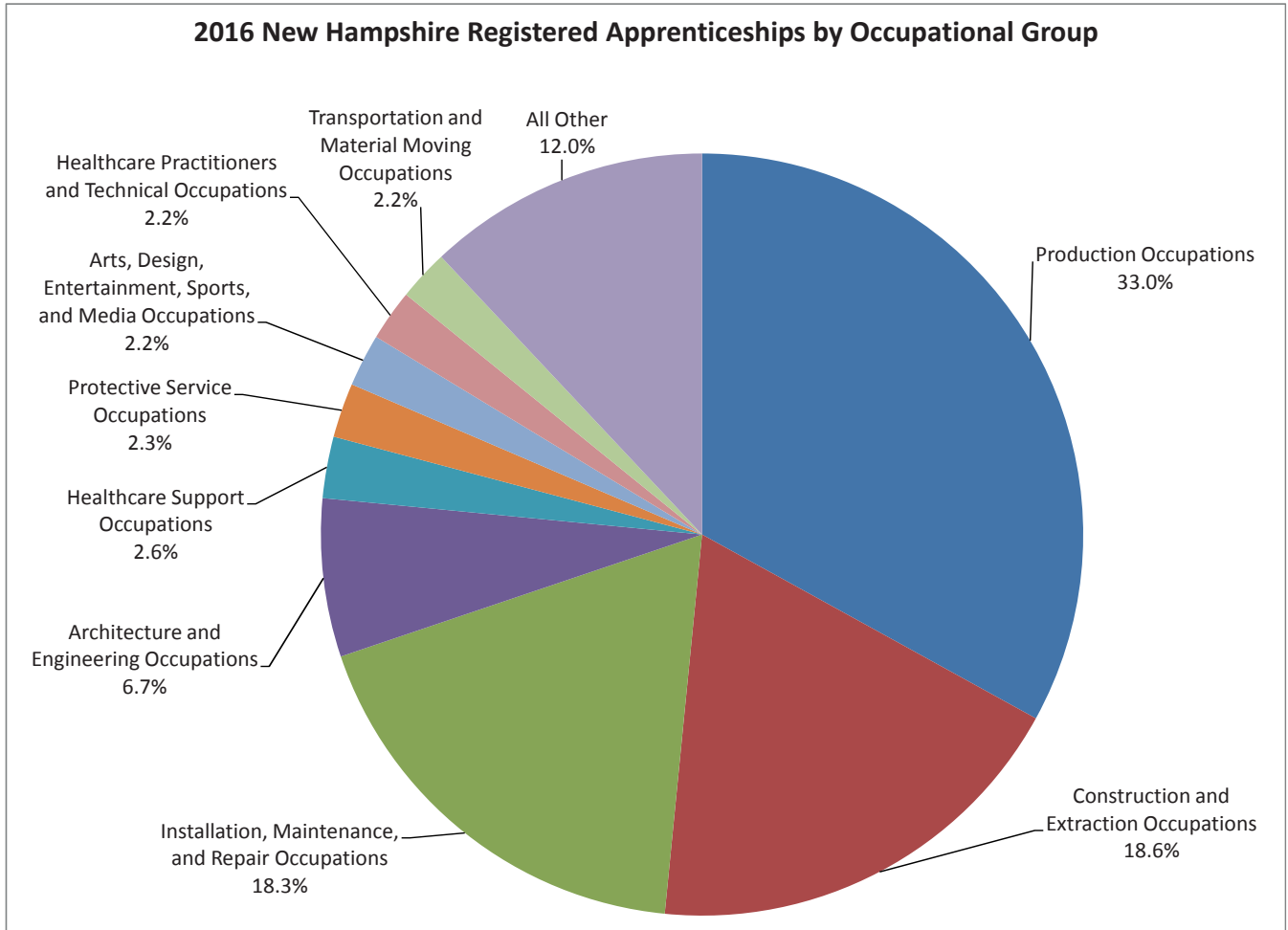
Among middle education occupations in New Hampshire, there are a dozen for which apprenticeship is the usual on-the-job training method of achieving competency for entry-level employment. Nearly all of these occupations are in the *Construction and extraction occupations* group. However, apprenticeship can be an option for any middle education occupation, and is currently used by employers in manufacturing, protective services, healthcare, transportation, information technology, and hospitality as well as construction.

⁴⁴ ApprenticeshipUSA, Employment and Training Administration, U.S. Department of Labor. Accessed April 24, 2017 www.doleta.gov/OA/bul16/Buletin_2016-28_Attachment1.pdf. Revised March 2016.

⁴⁵ About O*Net, O*Net Resource Center, www.onetcenter.org/overview.html. Note: O*Net-SOC codes are based on the Standard Occupational Classification (SOC), but adds occupational specification by adding two digits to the SOC code.

⁴⁶ For purposes of comparison, RAPIDS occupations were crosswalked and consolidated to SOC codes.

⁴⁷ New Hampshire Employment Projections by Industry and Occupation, 2014-2024, Economic and Labor Market Information Bureau, New Hampshire Employment Security.



Source: U.S. Department of Labor - Office of Apprenticeship, Registered Apprenticeship Information System (RAIS), Report Time Period 02/01/2007 to 02/01/2017

Broadening the Perspective of Job Training Available Through Apprenticeship

Because of differences in occupational coding, a single SOC code frequently is representative of multiple apprenticeable occupations in the RAPIDS coding structure. These differences present a chance to broaden the perspective of available job training opportunities, as training guidelines exist for jobs more specifically defined than using an SOC description.

For example, SOC code 17-3029, *Engineering Technicians, Except Drafters, All Other*, is defined as “all engineering technicians, except drafters, not listed separately.” This generic description is of very little help to an employer who needs a worker with a specific set of skills. Based on RAPIDS coding, however, there are 34 different occupational titles that are classified as SOC 17-3029, such as Laboratory assistant, metallurgical; Non-destructive tester, magnetic particle tech; Non-destructive tester, ultrasonic tech; and Non-destructive tester, thermal infrared tech.⁴⁸ Occupational titles classified under a single SOC code may differ in type or length of training, specific materials used, level of specialization, or industry. These more specialized occupational titles provide employers much more variety in finding an apprenticeship that fits their needs.

Apprenticeships for occupations on the official list have already been developed, but training may be developed for almost any occupation. The apprenticeships that have previously been developed can be used as a starting point to develop apprenticeships in other occupations.

Apprenticeship Program Design

There are three types of apprenticeships, offering flexibility in program design: time-based, competency-based, and hybrid, which combines time and competency achievement.

- **Time-based** apprenticeships require that the apprentice complete a specific number of hours in related instruction and in on-the-job training.
 - *Example: Machinist, requiring 8,000 hours of combined instruction and on-the-job training.*
- **Competency-based** apprenticeships allow the apprentice to progress at their own pace by demonstrating competency through assessments in skills and knowledge proficiency.
 - *Example: Pharmacy Service Associate, who must achieve specific competencies in eight different work areas in a minimum number of hours.*
- **Hybrid** apprenticeships are a combination of specific hours in related instruction and on-the-job training along with demonstration of competency through assessments of proficiency.
 - *Example: Industrial Manufacturing Technician, which requires 3,000 hours of related instruction and on-the-job training, combined with demonstration of achievement in eleven competencies, each of which require a specific number of training hours.*

⁴⁸ ApprenticeshipUSA, Employment and Training Administration, U.S. Department of Labor.
<https://www.doleta.gov/OA/occupations.cfm>

In addition to demonstrating competency in work processes and working, apprentices must complete related postsecondary instructional programs. Courses may be offered by a community college, a proprietary school, or the employer; some coursework may be available on-line. Many programs of related instruction result in an educational certification, such as an advanced manufacturing certification or an electrical technology certificate. Related instructional programs can also be an apprentice's stepping stone to future educational opportunities such as attaining a degree, boosting the apprentice up a career ladder.

Registered Apprenticeship. While employers and workers may utilize apprenticeship training that is not registered with the U.S. Department of Labor, there are distinct benefits to registration.⁴⁹ For the apprentice, completers of a registered apprenticeship receive a national, industry-recognized credential. This is confirmation that the apprentice has graduated from a program that has met national and independent standards for quality and rigor. This credential is recognized throughout the United States. For the employer, a registered apprenticeship provides technical assistance and support, a quality standard of training, and access to federal resources.

Where to Begin: A Quick Start Toolkit ⁵⁰

The U.S. Department of Labor's Office of Apprenticeship has created a tool kit to educate employers about registered apprenticeships. The tool kit provides guidance on how apprenticeship works, a step-by-step process for establishing an apprenticeship, and highlights the benefits of apprenticeship for both the employer and the apprentice.

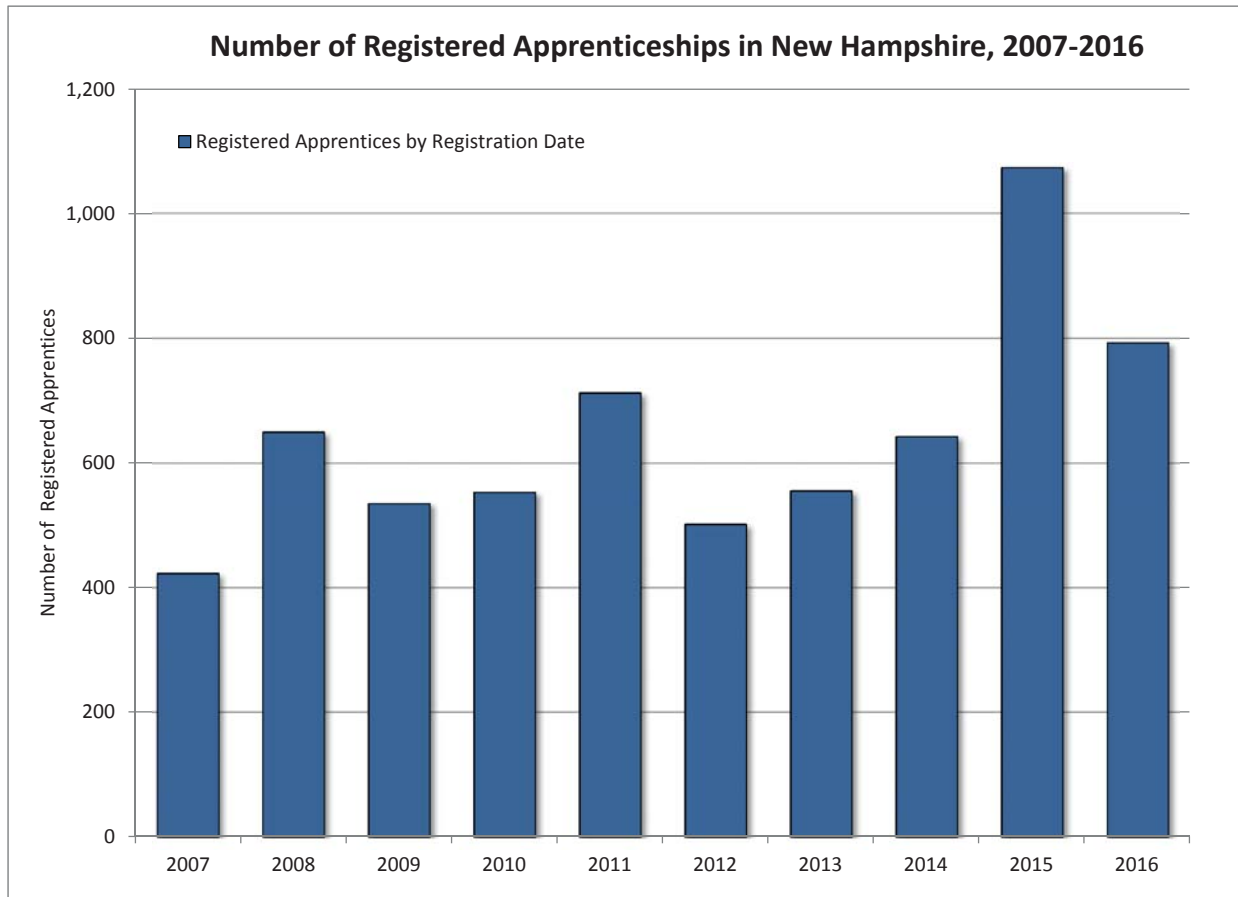
For more information about apprenticeship, becoming a sponsor or partner, registering a program, or becoming an apprentice, contact the New Hampshire State Director, Office of Apprenticeship at (603) 225-1444 or visit the U.S. Department of Labor, Office of Apprenticeship online at www.dol.gov/apprenticeship.

⁴⁹ Frequently Asked Questions, Apprenticeship USA Toolkit, U.S. Department of Labor
<https://www.dol.gov/apprenticeship/toolkit/toolkitfaq.htm>

⁵⁰ A Quick-Start Tool Kit: Building Registered Apprenticeship Programs. U.S. Department of Labor, Office of Apprenticeship.
https://www.doleta.gov/oa/employers/apprenticeship_toolkit.pdf

New Hampshire Registered Apprenticeship: An Evolving Landscape

Over the last decade, there has been an increase in the number of registered apprentices, both nationally and in New Hampshire. The count of registered apprentices in New Hampshire⁵¹ from year to year has varied, but there has been an upward trend over the last ten years. In 2007, 423 apprentices were registered, and by 2016, that number had increased to 794.

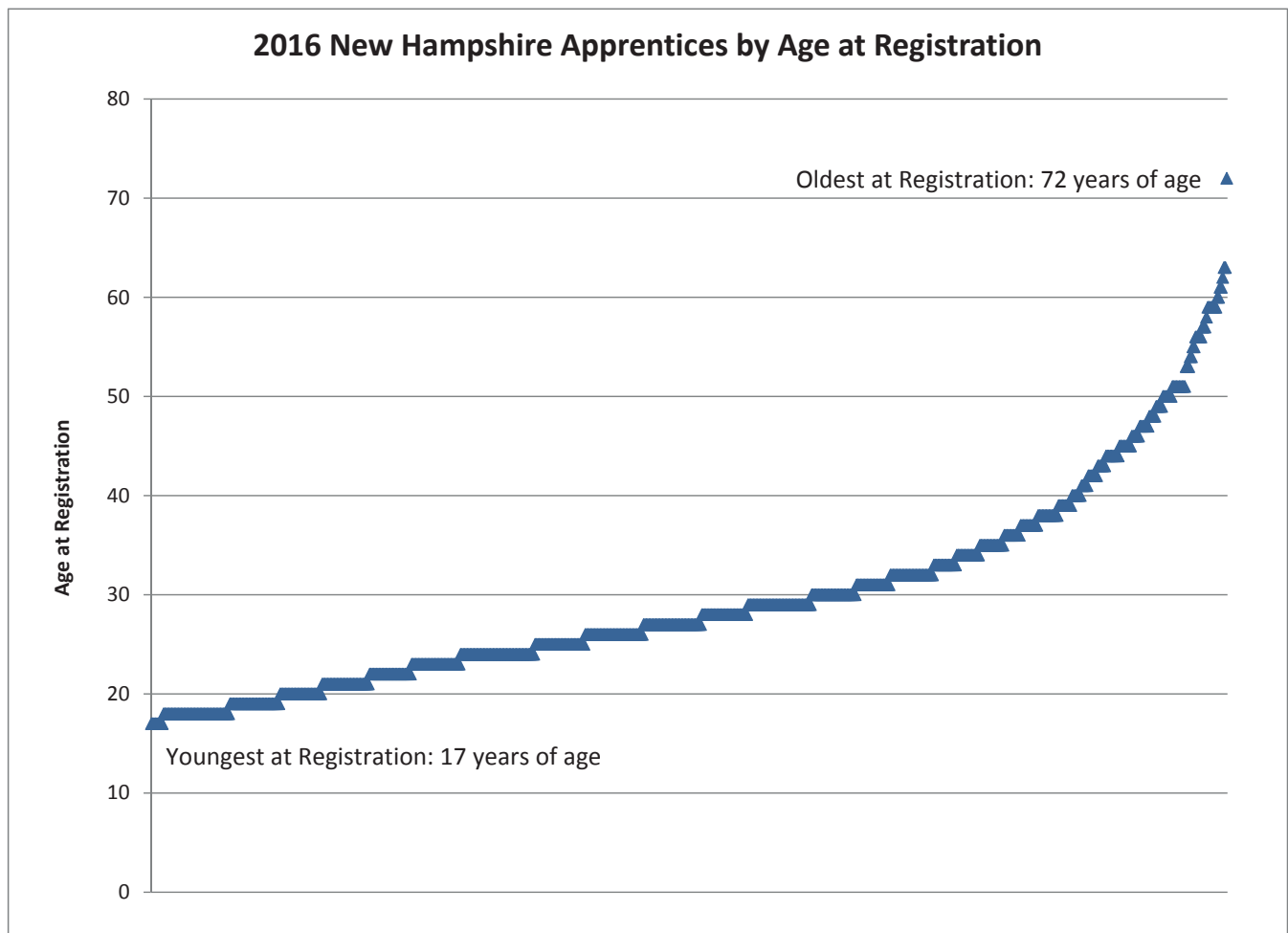


Source: U.S. Department of Labor - Office of Apprenticeship, Registered Apprenticeship Information System (RAIS), Report Time Period 02/01/2007 to 02/01/2017

The surge in the number of registered apprentices has been boosted in part by an increase in the number of female apprentices. In 2007, females represented five percent of apprentices, and by 2016, females held a 14 percent share.

Based on age at registration, the mean age of apprentices in New Hampshire increased slightly between 2007 and 2016, from 28.4 to 29.6 years. In 2016, registered apprentices had a very large range in age, going from 17 years to 72 years of age. The majority, however, are between 18 and 33 years old at registration. It is important to note that becoming an apprentice is possible no matter the age of the candidate. Actually, relatively few apprentices were the age of a recent high school graduate.

⁵¹ The count of apprentices in New Hampshire includes apprentices at the Portsmouth Naval Shipyard, although this employer is physically located in Maine.



Source: U.S. Department of Labor - Office of Apprenticeship, Registered Apprenticeship Information System (RAIS), Report Time Period 02/01/2007 to 02/01/2017

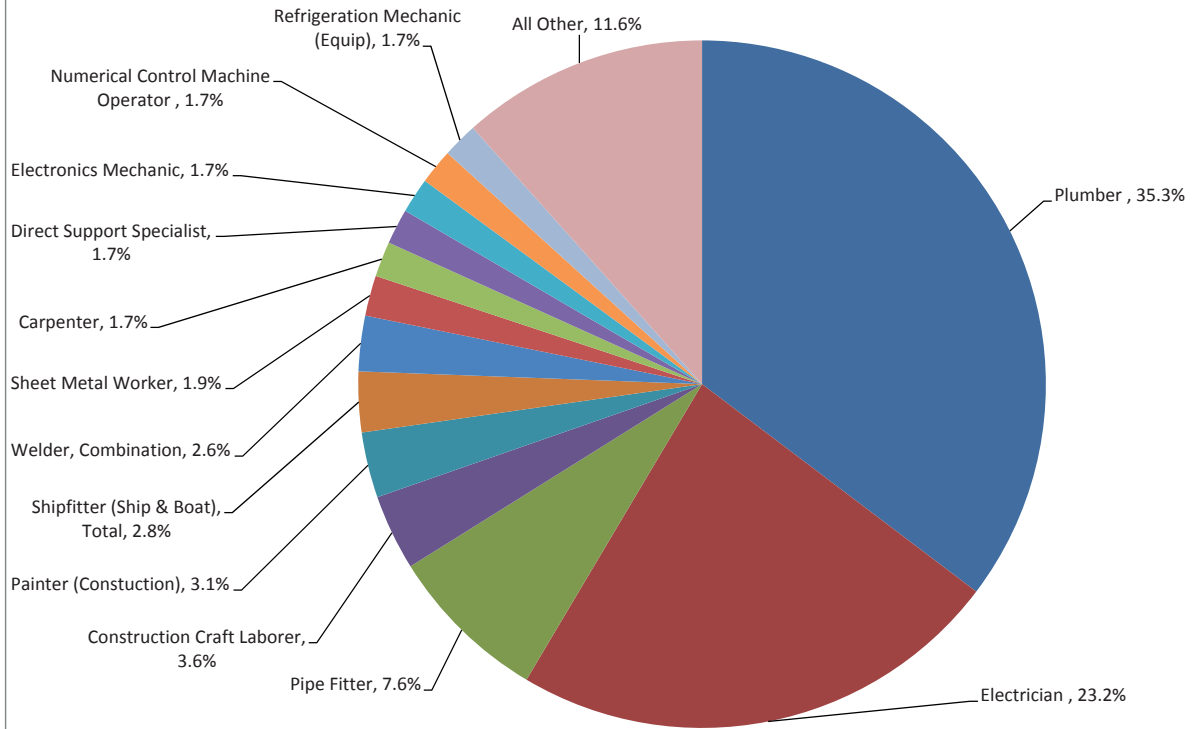
Comparing registered apprenticeship data for New Hampshire between 2007 and 2016 shows a shift in the share of apprentices by occupation. Though the number of plumbing and electrician apprentices increased over time, the share of all apprentices in these two occupations decreased. Some of this shift can be attributed to an increase in the number of occupations in which apprentices are registered. In 2007, 423 apprentices were registered in 28 different occupations; by 2016, 794 apprentices were registered in 38 different occupations.

The most noticeable change was the addition of the *Medical Assistant* apprenticeship, which accounted for 6.3 percent of registered apprentices in 2016. Nearly all of these apprentices were female. There were female apprentices in the more traditional apprenticed occupations as well, such as electrician, plumber, and machinist, but the share of females in these occupations changed little from 2007 to 2016.

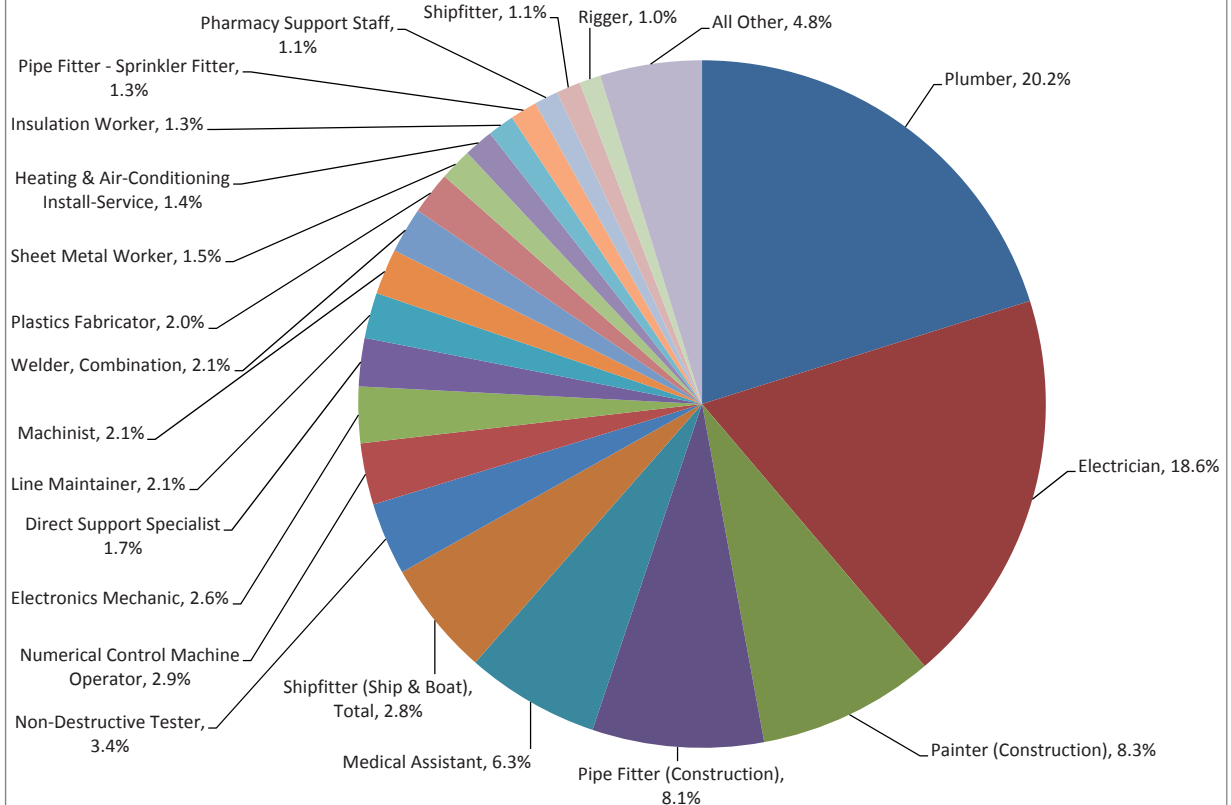
The expansion of apprenticeships into new occupations and increasing use of registered apprenticeship is encouraging. Apprenticeship has demonstrated its potential as a viable avenue to meet the steady demand for workers in middle education jobs.

Perspectives on Middle Education Occupations in New Hampshire

Number of Registered Apprentices by Occupation, 2007



Number of Registered Apprentices by Occupation, 2016



Source: U.S. Department of Labor - Office of Apprenticeship, Registered Apprenticeship Information System (RAIS), Report Time Period 02/01/2007 to 02/01/2017

Modeling the Economic Impact of Jobs in Middle Education Occupations

Jobs in middle education occupations make a significant contribution to New Hampshire's economy. Employment, population, and productivity are just some of the measures that would be affected if these jobs were no longer in the economy. The magnitude of these effects can be estimated by the use of economic modeling software and the creation of a 'counterfactual' scenario that shows interdependencies throughout the economy.

Author: Michael Argiropolis, Labor Market Analyst

Middle education occupations have a significant economic effect in New Hampshire, impacting employment, population, and gross domestic product. Workers in each middle education job earn wages, creating demand for products and services. This demand generates the need for additional jobs, as other workers provide these products and services, and the workers in those jobs earn wages and demand products and services of their own. Economic activity in turn impacts the state's gross domestic product.

What is the value of jobs in middle education occupations to the New Hampshire economy? Is it possible to attach a dollar figure to it? What industries would be the most affected? These questions were answered through a detailed analysis using REMI Policy Insight, proprietary economic modeling software developed by Regional Economic Models, Inc.

Modeling the effect of middle education occupations presents a challenge in that the analysis required is not a real economic event, but a “counterfactual simulation,” that is, assuming something that has not happened or is not the case. In effect, the model is asked ‘what if’ these occupations were removed from the economy. By design, the REMI model assesses employment by industry only, and not by occupation.

To assess the impact of jobs in middle education occupations, industry staffing patterns are used to allocate occupational employment to the industries that typically employ workers in those occupations.⁵² The resulting employment numbers were then deducted from baseline employment in the 70 industry sectors in the REMI model. This method was used to isolate the value of middle education jobs on the New Hampshire economy.

Out of 700 occupations for which employment in New Hampshire was projected, 180 occupations were identified as having a middle education requirement, defined as: a high school diploma or equivalent plus related work experience, post-hire training of at least 12 months, or an apprenticeship; an Associate's degree; some college education (no degree); or a non-degree postsecondary certificate. Overall, these occupations totaled 171,400 workers in the base year of 2014.

⁵² For example, some electricians typically work for specialty trade contractors, but not all electricians work in that industry. Some are employed by colleges and universities, fabricated metal product manufacturers, hospitals, or government.

Based on staffing patterns, employment is allocated proportionally to those industries that employ electricians. Once employment of all middle education workers was allocated to the respective industries, the employment values were summed to provide a value of industry employment for these workers. These industry employment values were entered into the REMI model. However, the result illustrates the value of middle education workers to the New Hampshire economy.

About the REMI Model

REMI is a quantitative model that shows interdependencies throughout the economy. As an example, a small manufacturing firm that produces chairs would need to purchase wood, metal, supplies, and energy, as well as hire people to produce the product and provide administrative support. These expenditures provide profits to their suppliers and wages to their employees, who in turn, purchase other goods and services in the economy, to continue the cycle. The model replicates these transactions on a macroeconomic scale for the entire state.

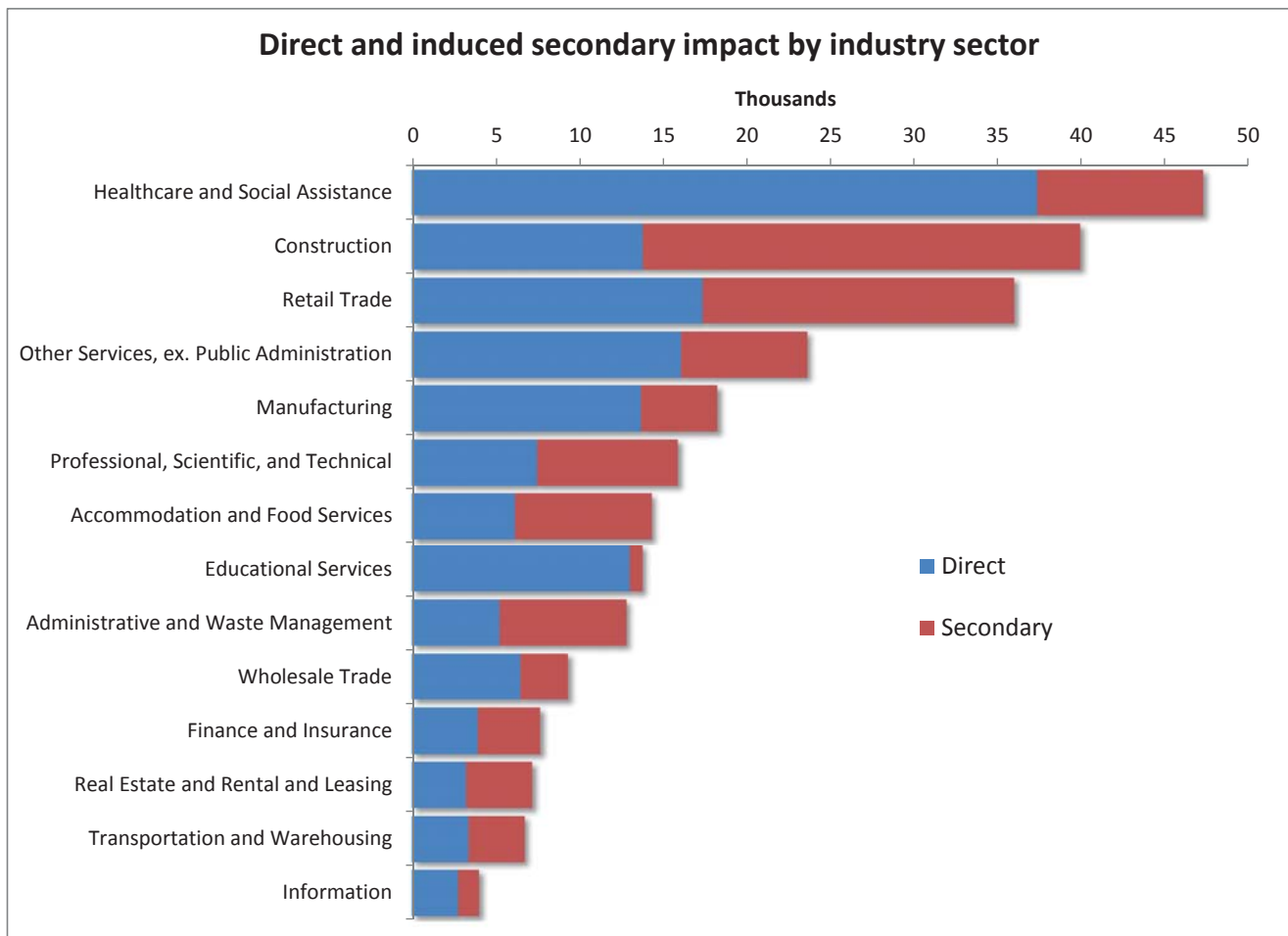
REMI contains a baseline forecast extending far into the future, up to 2060. In addition to employment, REMI provides forecasts for population, gross domestic product, labor force, output, personal income, and many other economic variables. Forecasts are driven by an input/output matrix that accounts for the raw materials and labor used by an industry to produce a product or provide a service. The model works under the assumption that firms strive to maximize profits and will allocate their resources — labor and capital — accordingly, and that consumers will seek to maximize their utility (get the most value for their money).

By modifying a baseline forecast, the economic effect of a change in policy by governments such as a cut in property taxes, or a significant change to the economy such as a plant closing or a new major construction proposal can be estimated. In the case of a tax cut, the effect can be modeled by decreasing government revenues while simultaneously increasing disposable income. For plant closings and economic development projects, a standard way to model the effect is to directly add or subtract employment in the affected industries. In this way, a forecaster can introduce a ‘shock’ or in other words, propose an alternative scenario and generate an entirely new forecast. Such a process is also known as a simulation.

Impact of Middle Education Occupations on Industry Sector Employment

To measure the value of jobs in middle education occupations, 171,000 workers were “removed” from the employment in related industries. This “removal” of workers was set to a point in time - 2017 - to assess the value over time. By measuring the resulting changes in economic indicators, an estimate of the value of these jobs is produced. The total impact of jobs in middle education occupations would be felt in all industry sectors, some more than others, either directly as an occupation designated as middle education, or secondarily as a job other than one in a middle education occupation that will be induced by economic activity created by the direct job.

Over the 14-year period of the simulation, jobs in middle education occupations would create an impact on the New Hampshire economy, starting with 294,020 jobs in 2017. By 2030, the impact would increase to 300,000 jobs. This indicates that the original 171,000 jobs in middle education occupations have an employment multiplier effect of 1.7 jobs, meaning that for each job, an additional 0.7 jobs are created.



Source: REMI PI+ 70-sector 1-region version 2.0.3 of New Hampshire

The value of jobs in middle education occupations to industry employment in New Hampshire can be assessed by the initial (2017) impact of “removing” direct and secondary jobs from the economy. Direct jobs are those in middle education occupations, while secondary impact jobs may be of any educational level.

The economic impact on employment in the *Health care and social assistance* sector would be 47,300 jobs initially, 37,300 direct jobs and an additional 10,000 secondary jobs (of all education levels) induced by jobs in middle education occupations. Occupations predominant in this sector include *First-line supervisors of office and administrative support workers, Registered nurses, Radiologic technicians, Nursing assistants, and Dental hygienists.*

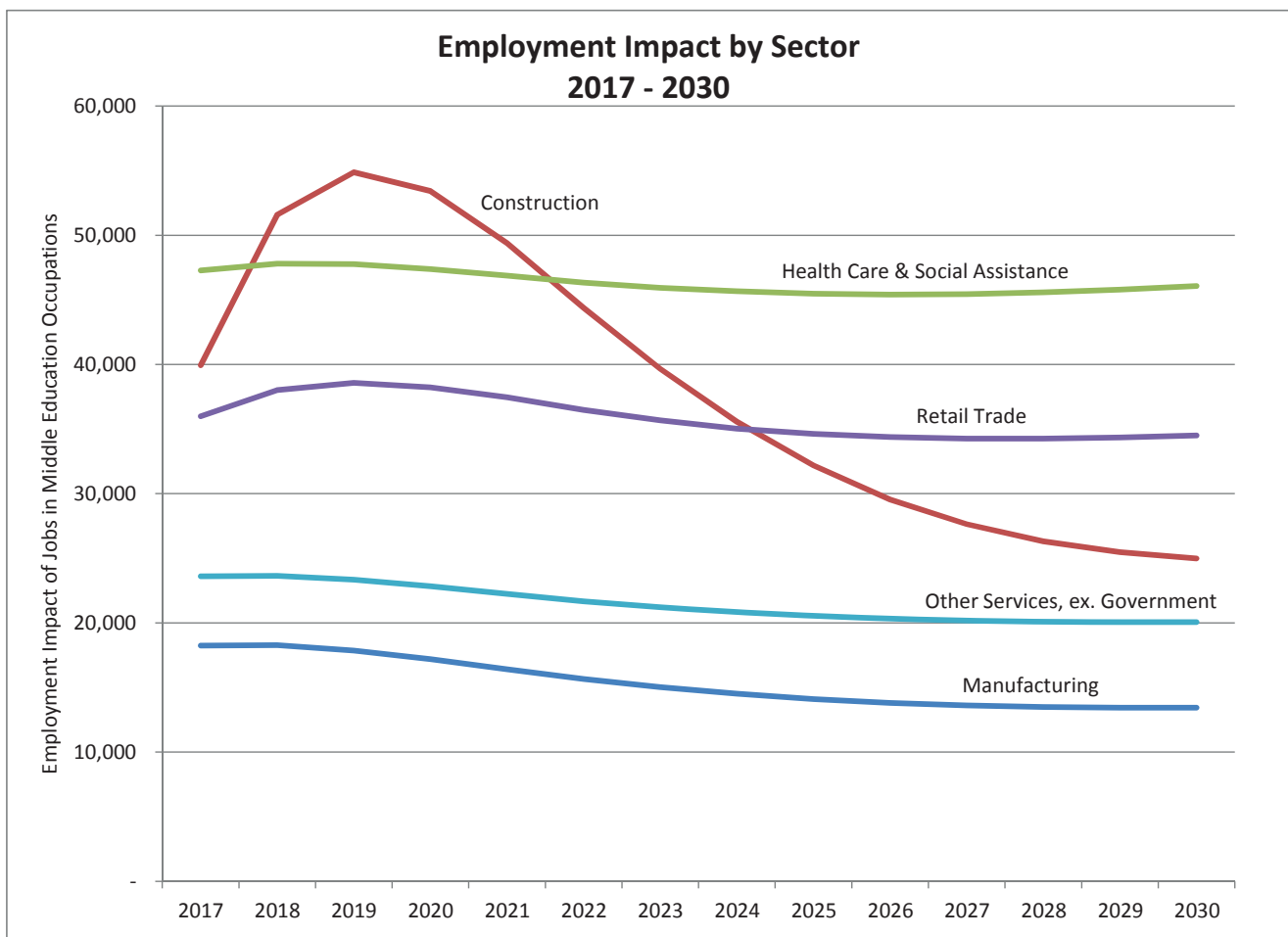
Construction employment would account for 39,900 jobs in the first year, with 13,800 direct jobs and an additional 26,200 secondary jobs. Occupations predominant in this sector include *Carpenters; Electricians; Plumbers, pipefitters, and steamfitters; Heavy and tractor-trailer truck drivers; and First-line supervisors of construction trades and extraction workers.*

Employment in the *Retail trade* sector would account for 36,000 jobs in the first year, with 17,400 direct jobs and an additional 18,600 secondary jobs. Occupations predominant in this sector include *First-line supervisors of retail sales workers; Automotive service technicians and mechanics; Heating, air conditioning, and refrigeration mechanics and installers; and Bookkeeping, accounting, and auditing clerks.*

Other services, except public administration, would account for 23,600 jobs in the first year, with 16,100 direct jobs and an additional 7,500 secondary jobs. Occupations predominant in this sector include *Automotive body and related repairers; Hairdressers, hairstylists, and cosmetologists; Massage therapists; and Teacher assistants.*

Employment in the *Manufacturing* sector would account for 13,700 direct jobs and another 4,600 secondary jobs. Occupations predominant in this sector include *Industrial machinery mechanics, Machinists, and First-line supervisors of production and operating workers.*

Fewer workers in middle education occupations are typically employed in the *Information, Utilities, and Real estate* industry sectors, therefore the impact of these workers is negligible.



Source: REMI PI+ 70-sector 1-region version 2.0.3 of New Hampshire

Impact of Middle Education Occupations through 2030

If the jobs in middle education occupations were “removed” from the economy, there would be a significant impact on several industry sectors, with five sectors affected by over 18,000 jobs in the initial year. The value of goods and services provided by jobs in these occupations flows through the economy and provides wages for workers and profits for businesses. Productivity would decline without jobs in middle occupations in the economy, and demand for goods and services would eventually be reduced, causing further declines.

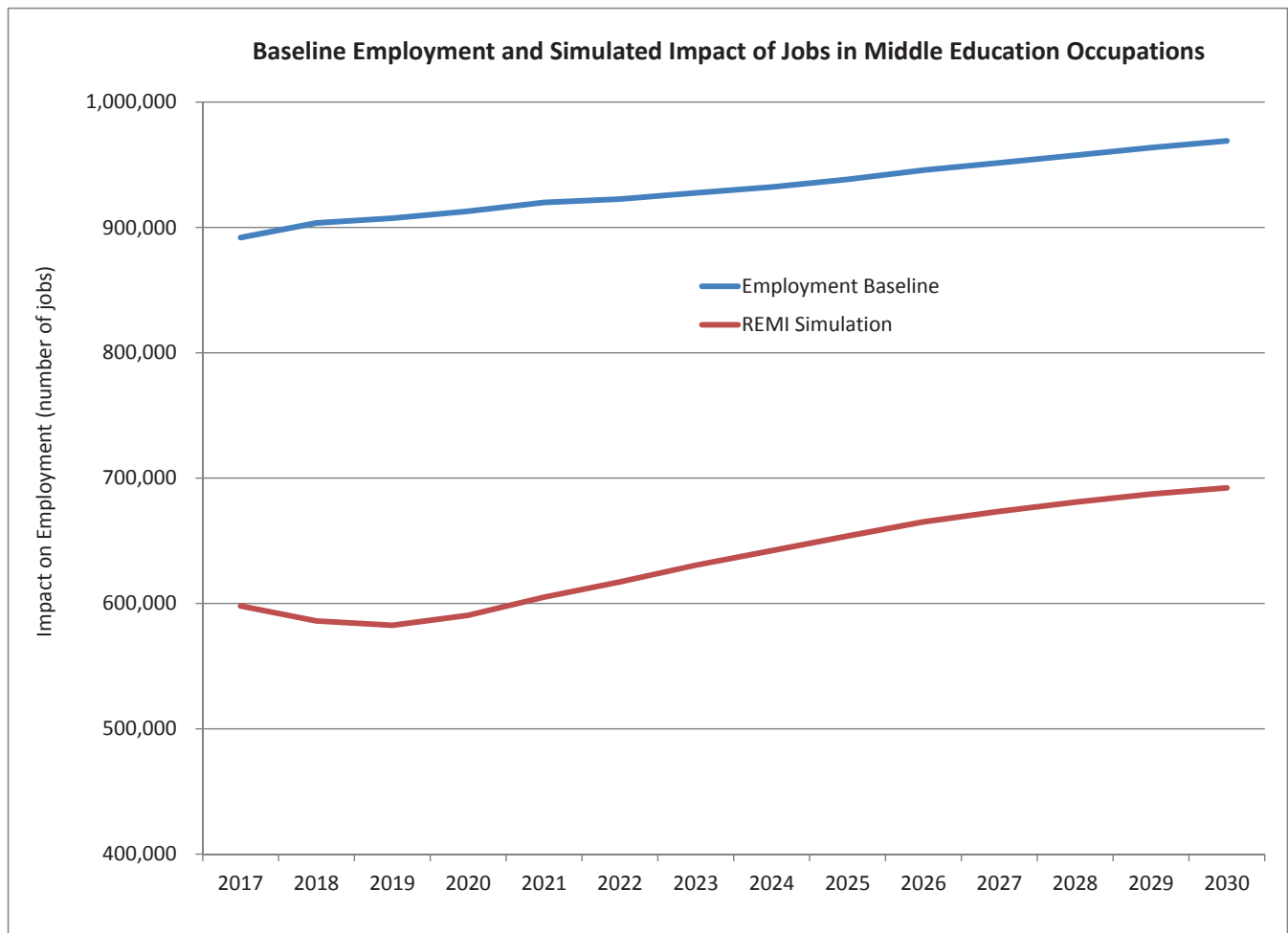
Sectors respond to economic shock in various ways, often depending on the mix of inputs used, in terms of labor and capital. Construction, for example, requires capital expenditures such as heavy machinery, along with labor. Within the first two years, the greatest impact from the “removal” of jobs in middle education occupations would be in the Construction sector. Initially, the impact would be 40,000 jobs, direct and secondary, reaching 60,000 jobs two years later. The reason for the immediate impact is that regardless of fewer workers in the economy, there is a continuing need for infrastructure, such as new housing and commercial buildings, and road construction. After a few years, the impact on Construction jobs would be reduced as the economy adjusts, and firms and individuals find substitutes for business services unavailable in the local area, such as obtaining services from other states.

The other sectors would react in a similar fashion, with the initial employment impact tailing off over time, as businesses and individuals either leave the area or seek services from outside the local area.

Effect on the New Hampshire Economy

Middle education occupations are a vital part of New Hampshire’s economy; consequently the impact of “removing” 171,000 jobs with that educational level would reverberate throughout the economy. The impact on the economy can be measured by: employment, population, and gross domestic product.

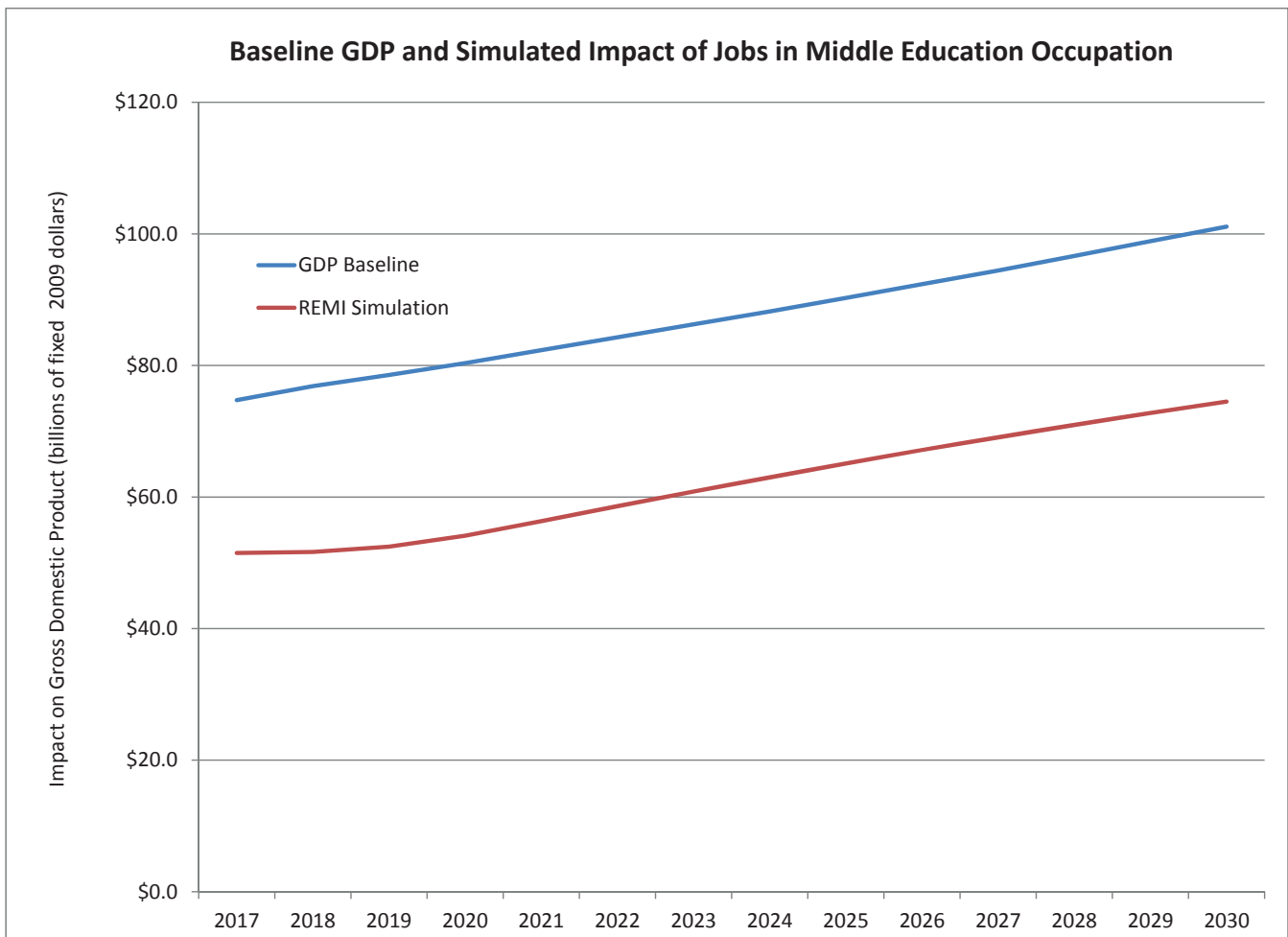
The effect of jobs in middle education occupations on the New Hampshire economy can be seen in the gap between the baseline and the REMI simulation. The baseline for each measure represents the total estimated economic value in New Hampshire without change, while the REMI simulation line represents a simulated economic value resulting from the “removal” of jobs in middle education occupations, plus secondary jobs. The gap between the two lines is the estimated impact of jobs in middle education occupations on the New Hampshire economy.



Source: REMI PI+ 70-sector 1-region version 2.0.3 of New Hampshire

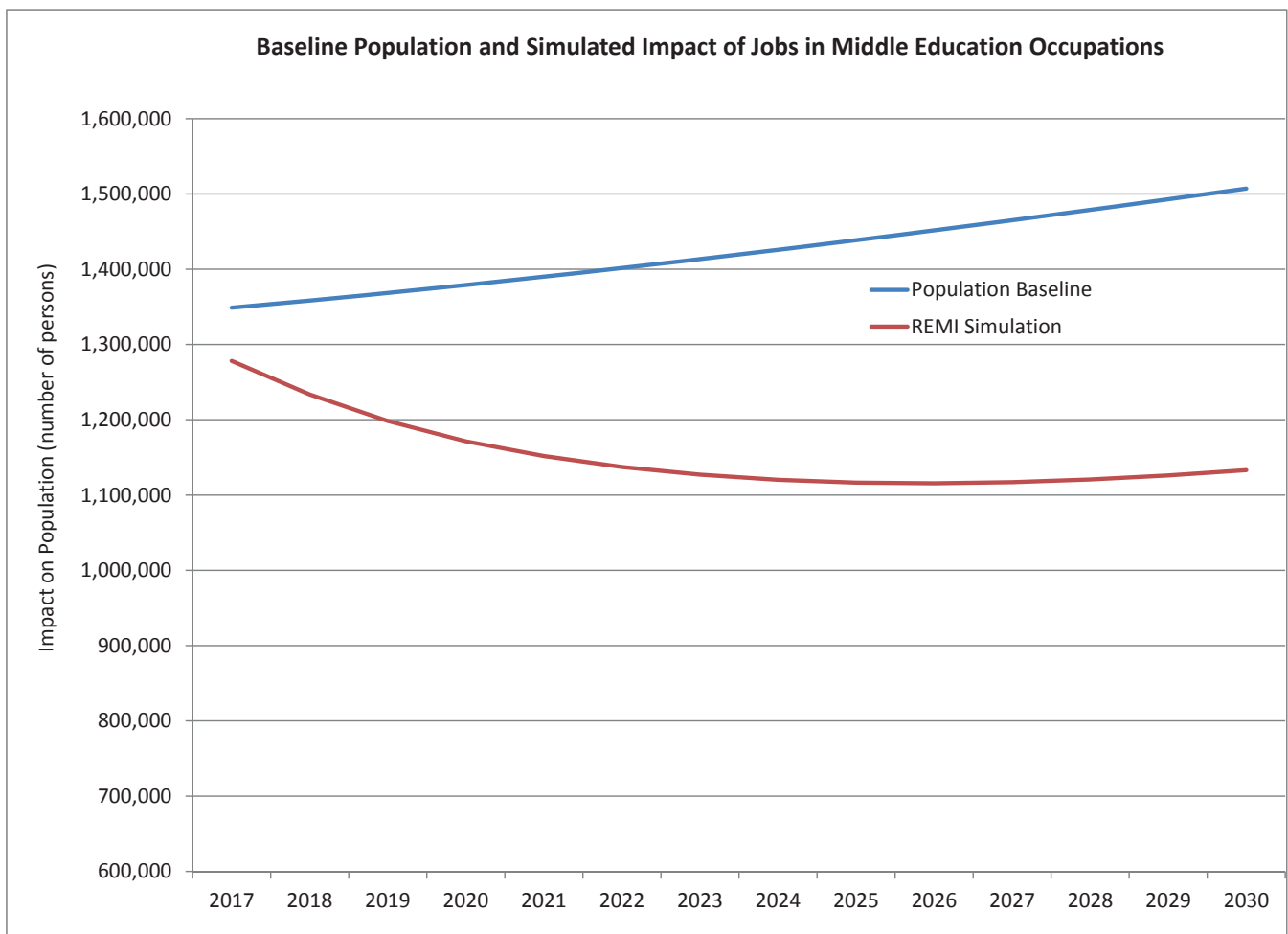
Employment.⁵³ Initially, the jobs in middle education occupations would have an impact of 294,000 jobs. As the effect of “removing” jobs in middle education occupations reacts throughout the economy, the impact on total employment would be the greatest in 2019, 325,000 jobs below the baseline estimate. In the following years, as businesses and individuals find alternatives to support the demand for products and services, the impact on employment would trend closer to the original baseline value.

⁵³ The REMI model utilizes employment estimates produced the US Bureau of Economics Analysis (BEA) which include multiple job holders, commuters from other states, sole proprietors of a business and active partners. These employment estimates also include workers in industries not covered by Unemployment Insurance, such as nonprofit organizations or private elementary and secondary schools. Due to definitional differences, baseline employment estimates in the REMI model are higher than labor force estimates, covered employment levels, and Current Employment Statistics (CES) estimates released by the Economic and Labor Market Information Bureau.



Source: REMI PI+ 70-sector 1-region version 2.0.3 of New Hampshire

Gross Domestic Product. The impact of jobs in middle education occupations on the gross domestic product for New Hampshire would be \$23.3 billion in the first year, representing the value of goods and services produced by workers employed in middle education occupations. These goods and services are sold to others, providing value added to the economy. As the value of goods and services produced by jobs in middle education occupations echoes through the economy, the impact will peak at \$26.2 billion in 2020.



Source: REMI PI+ 70-sector 1-region version 2.0.3 of New Hampshire

Population. Jobs in middle education occupations also have an impact on the number of people living in the state. Without the goods and services produced by these workers, the economy would be negatively affected. Initially, over 70,700 people would be impacted. Some people would leave the state to look for other opportunities, causing a ripple effect throughout the economy as these people would no longer produce nor utilize any goods or services in the local economy.

Conclusion

Jobs in middle education occupations have a significant economic effect on employment, population, and gross domestic product in New Hampshire. For each job in a middle education occupation, 1.7 jobs are created in the state’s economy. Direct jobs create demand for products and services, which generates the need for additional jobs. The value of jobs in middle education occupations is estimated at \$23.9 billion in 2017, and is valued at roughly \$25 billion annually through 2030.

Appendices

Appendix A. Education and Training Definitions

The U.S. Bureau of Labor Statistics, Employment Projections Program, has established entry-level education and training needs for all occupations.⁵⁴ Each occupation is assigned typical education needed for entry, work experience in a related occupation, and typical on-the-job training needed to attain competency.

Typical Education Needed for Entry

Identifies the usual education workers need for entry-level employment. There are eight educational levels.

- **Doctoral or professional degree:** A Doctoral degree is an academic award requiring at least three years of study beyond a baccalaureate, resulting in a Ph.D., or a professional practice doctorate, which requires at least six years of academic study beyond a baccalaureate.
- **Master's degree:** An academic award requiring one to two years of academic study beyond a baccalaureate.
- **Bachelor's degree:** A baccalaureate is an academic award requiring at least four, but not more than five, years of full-time equivalent college-level work.
- **Associate's degree:** An academic award requiring at least two, but not more than four, years of full-time equivalent college-level work.
- **Postsecondary non-degree award:** Formal postsecondary schooling leading to an award but not a degree which may last from a few weeks up to two years.
- **Some college, no degree:** Achievement of a high school diploma or equivalent plus one or more postsecondary courses that did not result in a degree or award.
- **High school diploma or equivalent:** Completion of a high school diploma or equivalent credential.
- **No formal educational credential:** Entry into the occupations typically does not need any formal credentials issued by an educational institution, such as a high school diploma or postsecondary certificate.

Work Experience in a Related Occupation

Identifies related work experience typically needed for entry-level employment.

- **Five years or more:** Occupations requiring five years or more work experience in a related occupation.
- **Less than five years:** Occupations requiring work experience of less than five years.
- **None:** Related work experience is not typically needed for entry-level employment.

⁵⁴ U.S. Bureau of Labor Statistics, Occupational Data Definitions, April 2016. https://www.bls.gov/emp/ep_nem_definitions.htm

Typical On-the-Job Training Needed to Attain Competency in the Occupation

Identifies training typically needed after hire to attain competency in the skills needed in the occupation. Training is occupation-specific, and can easily be transferred to another job in the same occupation.

- **Internship/Residency:** Preparation in a field such as teaching or medicine, generally under supervision in a professional setting.
- **Apprenticeship:** A formal relationship between a worker and sponsor that combines on-the-job training and related occupation-specific technical instruction, lasting three to five years on average.
- **Long-Term On-the-Job Training:** More than 12 months of on-the-job training; may combine experience and classroom instruction.
- **Moderate-Term On-the-Job Training:** Between one and 12 months of on-the-job experience and informal training.
- **Short-Term On-the-Job Training:** One month or less on-the-job experience and informal training.
- **None:** Additional on-the-job training or experience typically is not needed to attain competency.

Appendix B. New Hampshire Occupational Employment Projections, 2014 - 2024

Middle Education Occupations by Entry-Level Educational Requirements

SOC Code	Occupation Title	2014	2024	Numeric Change	Percent Change	Average Annual Openings			Work Experience	Post-Hire Training
		Estimated	Projected			Growth	Replacement	Total		
Entry-Level Education of an Associate's Degree										
17-3021	Aerospace Engineering and Operations Technicians	n	n	n	n	n	n	n	None	None
19-4011	Agricultural and Food Science Technicians	n	n	n	n	n	n	n	None	Moderate OJT
53-2021	Air Traffic Controllers	447	437	-10	-2.2%	0	14	14	None	Long-term OJT
17-3011	Architectural and Civil Drafters	503	488	-15	-3.0%	0	6	6	None	None
49-2091	Avionics Technicians	89	89	0	0.0%	0	2	2	None	None
27-4012	Broadcast Technicians	137	150	13	9.5%	1	3	4	None	Short-term OJT
29-2031	Cardiovascular Technologists and Technicians	185	218	33	17.8%	3	4	7	None	None
19-4031	Chemical Technicians	150	158	8	5.3%	1	4	5	None	Moderate OJT
17-3022	Civil Engineering Technicians	156	165	9	5.8%	1	4	5	None	None
15-1152	Computer Network Support Specialists	512	560	48	9.4%	5	7	12	None	None
29-2021	Dental Hygienists	1,176	1,347	171	14.5%	17	19	36	None	None
43-9031	Desktop Publishers	68	57	-11	-16.2%	0	2	2	None	Short-term OJT
29-2032	Diagnostic Medical Sonographers	200	237	37	18.5%	4	4	8	None	None
29-2051	Dietetic Technicians	122	138	16	13.1%	2	1	3	None	None
17-3019	Drafters, All Other	191	181	-10	-5.2%	0	2	2	None	None
17-3012	Electrical and Electronics Drafters	154	161	7	4.5%	1	2	3	None	None
17-3023	Electrical and Electronics Engineering Technicians	1,078	1,078	0	0.0%	0	26	26	None	None
17-3024	Electro-Mechanical Technicians	158	163	5	3.2%	0	4	4	None	None
17-3029	Engineering Technicians, Except Drafters, All Other	559	569	10	1.8%	1	14	15	None	None
17-3025	Environmental Engineering Technicians	n	n	n	n	n	n	n	None	None
19-4091	Environmental Science and Protection Technicians, Including Health	237	265	28	11.8%	3	10	13	None	None
19-4093	Forest and Conservation Technicians	67	65	-2	-3.0%	0	3	3	None	None
11-9061	Funeral Service Managers	n	n	n	n	n	n	n	< 5 years	None
19-4041	Geological and Petroleum Technicians	25	28	3	12.0%	0	1	1	None	Moderate OJT
43-4161	Human Resources Assistants, Except Payroll and Timekeeping	546	531	-15	-2.7%	0	6	6	None	None
17-3026	Industrial Engineering Technicians	419	425	6	1.4%	1	10	11	None	None
19-4099	Life, Physical, and Social Science Technicians, All Other	184	199	15	8.2%	2	8	10	None	None
29-2035	Magnetic Resonance Imaging Technologists	111	111	0	0.0%	0	2	2	< 5 years	None
17-3013	Mechanical Drafters	287	269	-18	-6.3%	0	3	3	None	None
17-3027	Mechanical Engineering Technicians	375	406	31	8.3%	3	9	12	None	None
29-2012	Medical and Clinical Laboratory Technicians	480	524	44	9.2%	4	12	16	None	None
49-9062	Medical Equipment Repairers	147	158	11	7.5%	1	3	4	None	Moderate OJT
39-4031	Morticians, Undertakers, and Funeral Directors	93	99	6	6.5%	1	2	3	None	Long-term OJT
29-2033	Nuclear Medicine Technologists	52	51	-1	-1.9%	0	1	1	None	None
19-4051	Nuclear Technicians	n	n	n	n	n	n	n	None	Moderate OJT
31-2011	Occupational Therapy Assistants	175	225	50	28.6%	5	5	10	None	None
23-2011	Paralegals and Legal Assistants	1,265	1,317	52	4.1%	5	28	33	None	None
31-2021	Physical Therapist Assistants	515	699	184	35.7%	18	15	33	None	None
25-2011	Preschool Teachers, Except Special Education	2,854	3,001	147	5.2%	15	84	99	None	None
29-1124	Radiation Therapists	116	125	9	7.8%	1	3	4	None	None
49-2021	Radio, Cellular, and Tower Equipment Installers and Repairers	n	n	n	n	n	n	n	None	Moderate OJT
29-2034	Radiologic Technologists	773	803	30	3.9%	3	15	18	None	None
29-1141	Registered Nurses	12,592	14,528	1,936	15.4%	194	297	491	None	None
29-1126	Respiratory Therapists	372	412	40	10.8%	4	9	13	None	None
29-2054	Respiratory Therapy Technicians	n	n	n	n	n	n	n	None	None
51-9141	Semiconductor Processors	115	113	-2	-1.7%	0	2	2	None	Moderate OJT
29-2056	Veterinary Technologists and Technicians	721	872	151	20.9%	15	7	22	None	None
15-1134	Web Developers	907	1,172	265	29.2%	26	12	38	None	None

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Source: Economic and Labor Market Information Bureau, New Hampshire Employment Security

Perspectives on Middle Education Occupations in New Hampshire

SOC Code	Occupation Title	2014 Estimated	2024 Projected	Numeric Change	Percent Change	Average Annual Growth	Annual Openings Replacement	Total	Work Experience	Post-Hire Training
Entry-Level Education of Some College, No Degree										
27-2011	Actors	44	47	3	6.8%	0	2	2	None	Long-term OJT
43-3031	Bookkeeping, Accounting, and Auditing Clerks	8,071	7,449	-622	-7.7%	0	79	79	None	Moderate OJT
15-1151	Computer User Support Specialists	2,456	2,753	297	12.1%	30	32	62	None	None
49-2011	Computer, Automated Teller, and Office Machine Repairers	865	915	50	5.8%	5	17	22	None	Short-term OJT
25-9041	Teacher Assistants	11,802	12,320	518	4.4%	52	283	335	None	None
Entry-Level Education of a Postsecondary Non-Degree Certificate										
49-3011	Aircraft Mechanics and Service Technicians	245	255	10	4.1%	1	6	7	None	None
27-4011	Audio and Video Equipment Technicians	76	84	8	10.5%	1	1	2	None	Short-term OJT
49-3023	Automotive Service Technicians and Mechanics	4,213	4,372	159	3.8%	16	113	129	None	Short-term OJT
39-5011	Barbers	526	583	57	10.8%	6	10	16	None	None
53-5021	Captains, Mates, and Pilots of Water Vessels	94	112	18	19.1%	2	4	6	< 5 years	None
49-9092	Commercial Divers	36	44	8	22.2%	1	0	1	None	Moderate OJT
23-2091	Court Reporters	74	79	5	6.8%	0	2	2	None	Short-term OJT
31-9091	Dental Assistants	1,315	1,509	194	14.8%	19	32	51	None	None
49-2092	Electric Motor, Power Tool, and Related Repairers	n	n	n	n	n	n	n	None	Long-term OJT
49-2093	Electrical and Electronics Installers and Repairers, Transportation Equipment	39	40	1	2.6%	0	1	1	None	Long-term OJT
49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	292	308	16	5.5%	2	5	7	None	Long-term OJT
49-2095	Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	45	40	-5	-11.1%	0	1	1	None	Long-term OJT
49-2096	Electronic Equipment Installers and Repairers, Motor Vehicles	44	24	-20	-45.5%	0	1	1	None	Short-term OJT
49-2097	Electronic Home Entertainment Equipment Installers and Repairers	188	202	14	7.4%	1	3	4	None	Short-term OJT
39-4011	Embalmers	n	n	n	n	n	n	n	None	Short-term OJT
29-2041	Emergency Medical Technicians and Paramedics	980	1,205	225	23.0%	22	16	38	None	None
33-2021	Fire Inspectors and Investigators	59	62	3	5.1%	0	2	2	5+ years	Moderate OJT
33-2011	Firefighters	1,504	1,594	90	6.0%	9	44	53	None	Long-term OJT
33-1021	First-Line Supervisors of Fire Fighting and Prevention Workers	493	522	29	5.9%	3	23	26	< 5 years	Moderate OJT
39-5012	Hairdressers, Hairstylists, and Cosmetologists	3,520	3,864	344	9.8%	34	91	125	None	None
29-9099	Other	613	692	79	12.9%	8	12	20	None	None
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	1,394	1,416	22	1.6%	2	21	23	None	Long-term OJT
53-3032	Heavy and Tractor-Trailer Truck Drivers	7,189	7,519	330	4.6%	33	122	155	None	Short-term OJT
13-1032	Insurance Appraisers, Auto Damage	49	48	-1	-2.0%	0	1	1	None	Moderate OJT
25-4031	Library Technicians	650	683	33	5.1%	3	31	34	None	None
29-2061	Licensed Practical/Licensed Vocational Nurses	2,091	2,454	363	17.4%	36	60	96	None	None
39-5092	Manicurists and Pedicurists	631	696	65	10.3%	6	5	11	None	None
31-9011	Massage Therapists	1,852	2,124	272	14.7%	27	14	41	None	None
31-9092	Medical Assistants	2,129	2,542	413	19.4%	41	44	85	None	None
29-2071	Medical Records and Health Information Technicians	888	1,012	124	14.0%	12	20	32	None	None
31-9094	Medical Transcriptionists	315	307	-8	-2.5%	0	7	7	None	None
53-5022	Motorboat Operators	n	n	n	n	n	n	n	< 5 years	None
49-3052	Motorcycle Mechanics	221	226	5	2.3%	0	4	4	None	Short-term OJT
31-1014	Nursing Assistants	8,548	10,026	1,478	17.3%	148	193	341	None	None
29-2057	Ophthalmic Medical Technicians	218	263	45	20.6%	4	2	6	None	None
31-9097	Phlebotomists	669	790	121	18.1%	12	14	26	None	None
51-5111	Prepress Technicians and Workers	141	108	-33	-23.4%	0	2	2	None	None
29-2053	Psychiatric Technicians	41	47	6	14.6%	1	0	1	< 5 years	Short-term OJT
53-5031	Ship Engineers	n	n	n	n	n	n	n	< 5 years	None
39-5094	Skincare Specialists	355	403	48	13.5%	5	3	8	None	None
27-4014	Sound Engineering Technicians	n	n	n	n	n	n	n	None	Short-term OJT
29-2055	Surgical Technologists	360	406	46	12.8%	5	4	9	None	None
49-2022	Telecommunications Equipment Installers and Repairers, Except Line Installers	1,222	1,137	-85	-7.0%	0	11	11	None	Moderate OJT

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Perspectives on Middle Education Occupations in New Hampshire

SOC Code	Occupation Title	2014	2024	Numeric Change	Percent Change	Average Annual Openings			Work Experience	Post-Hire Training
		Estimated	Projected			Growth	Replacement	Total		
Entry-Level Education of a High School Diploma or Equivalent Plus Experience, Apprenticeship, or Long-Term (12+ months) On-the-Job Training										
53-1011	Aircraft Cargo Handling Supervisors	n	n	n	n	n	n	n	< 5 years	None
53-2022	Airfield Operations Specialists	n	n	n	n	n	n	n	None	Long-term OJT
49-3021	Automotive Body and Related Repairers	758	814	56	7.4%	6	17	23	None	Long-term OJT
47-2011	Boilermakers	193	210	17	8.8%	2	3	5	None	Apprenticeship
47-2021	Brickmasons and Blockmasons	364	418	54	14.8%	5	3	8	None	Apprenticeship
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	844	963	119	14.1%	12	14	26	None	Long-term OJT
47-2031	Carpenters	4,138	4,353	215	5.2%	22	48	70	None	Apprenticeship
35-1011	Chefs and Head Cooks	759	831	72	9.5%	7	11	18	5+ years	None
51-8091	Chemical Plant and System Operators	n	n	n	n	n	n	n	None	Long-term OJT
27-2032	Choreographers	n	n	n	n	n	n	n	5+ years	Long-term OJT
13-1031	Claims Adjusters, Examiners, and Investigators	1,372	1,432	60	4.4%	6	34	40	None	Long-term OJT
51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	159	199	40	25.2%	4	5	9	None	Long-term OJT
47-4011	Construction and Building Inspectors	322	346	24	7.5%	2	9	11	5+ years	Moderate OJT
53-7021	Crane and Tower Operators	n	n	n	n	n	n	n	< 5 years	Moderate OJT
33-3021	Detectives and Criminal Investigators	324	339	15	4.6%	2	8	10	< 5 years	Moderate OJT
49-9051	Electrical Power-Line Installers and Repairers	804	838	34	4.2%	3	32	35	None	Long-term OJT
47-2111	Electricians	2,323	2,575	252	10.8%	25	36	61	None	Apprenticeship
47-4021	Elevator Installers and Repairers	n	n	n	n	n	n	n	None	Apprenticeship
53-7032	Excavating and Loading Machine and Dragline Operators	454	475	21	4.6%	2	5	7	< 5 years	Moderate OJT
43-6011	Executive Secretaries and Executive Administrative Assistants	1,610	1,523	-87	-5.4%	0	17	17	< 5 years	None
47-5031	Explosives Workers, Ordnance Handling Experts, and Blasters	n	n	n	n	n	n	n	< 5 years	Long-term OJT
49-3041	Farm Equipment Mechanics and Service Technicians	79	84	5	6.3%	0	2	2	None	Long-term OJT
11-9013	Farmers, Ranchers, and Other Agricultural Managers	3,955	4,030	75	1.9%	8	67	75	5+ years	None
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	2,467	2,620	153	6.2%	15	20	35	5+ years	None
33-1011	First-Line Supervisors of Correctional Officers	112	116	4	3.6%	0	3	3	< 5 years	Moderate OJT
45-1011	First-Line Supervisors of Farming, Fishing, and Forestry Workers	106	103	-3	-2.8%	0	3	3	< 5 years	None
35-1012	First-Line Supervisors of Food Preparation and Serving Workers	3,266	3,622	356	10.9%	36	97	133	< 5 years	None
53-1021	First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand	465	486	21	4.5%	2	15	17	< 5 years	None
37-1011	First-Line Supervisors of Housekeeping and Janitorial Workers	1,046	1,127	81	7.7%	8	16	24	< 5 years	None
37-1012	First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	988	1,061	73	7.4%	7	16	23	< 5 years	None
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	2,026	2,109	83	4.1%	8	40	48	< 5 years	None
41-1012	First-Line Supervisors of Non-Retail Sales Workers	2,415	2,566	151	6.3%	15	28	43	< 5 years	None
43-1011	First-Line Supervisors of Office and Administrative Support Workers	6,905	7,532	627	9.1%	63	104	167	< 5 years	None
39-1021	First-Line Supervisors of Personal Service Workers	1,013	1,131	118	11.6%	12	19	31	< 5 years	None
33-1012	First-Line Supervisors of Police and Detectives	488	515	27	5.5%	3	17	20	< 5 years	Moderate OJT
51-1011	First-Line Supervisors of Production/Operating Workers	2,792	2,816	24	0.9%	2	44	46	< 5 years	None
33-1099	First-Line Supervisors of Protective Service Workers, All Other	259	280	21	8.1%	2	7	9	< 5 years	None
41-1011	First-Line Supervisors of Retail Sales Workers	9,184	9,565	381	4.1%	38	205	243	< 5 years	None
53-1031	First-Line Supervisors of Transportation and Material-Moving Machine/Vehicle Operators	691	721	30	4.3%	3	22	25	< 5 years	None
53-2031	Flight Attendants	n	n	n	n	n	n	n	< 5 years	Moderate OJT
11-9051	Food Service Managers	1,559	1,658	99	6.4%	10	31	41	< 5 years	None
33-2022	Forest Fire Inspectors and Prevention Specialists	184	213	29	15.8%	3	5	8	< 5 years	Moderate OJT
11-9071	Gaming Managers	n	n	n	n	n	n	n	< 5 years	None
39-1011	Gaming Supervisors	48	52	4	8.3%	0	2	2	< 5 years	None

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Perspectives on Middle Education Occupations in New Hampshire

SOC Code	Occupation Title	2014	2024	Numeric Change	Percent Change	Average Annual Openings			Work Experience	Post-Hire Training
		Estimated	Projected			Growth	Replacement	Total		
Entry-Level Education of a High School Diploma or Equivalent Plus Experience, Apprenticeship, or Long-Term (12 months or more) On-the-Job Training										
51-8092	Gas Plant Operators	n	n	n	n	n	n	n	None	Long-term OJT
47-2121	Glaziers	89	91	2	2.2%	0	1	1	None	Apprenticeship
49-9041	Industrial Machinery Mechanics	2,168	2,591	423	19.5%	42	56	98	None	Long-term OJT
51-9071	Jewelers and Precious Stone and Metal Workers	111	95	-16	-14.4%	0	2	2	None	Long-term OJT
49-9094	Locksmiths and Safe Repairers	105	101	-4	-3.8%	0	5	5	None	Long-term OJT
53-4011	Locomotive Engineers	23	23	0	0.0%	0	1	1	< 5 years	Moderate OJT
11-9081	Lodging Managers	388	420	32	8.2%	3	7	10	< 5 years	None
51-4041	Machinists	2,357	2,700	343	14.6%	34	68	102	None	Long-term OJT
49-9071	Maintenance and Repair Workers, General	4,623	4,996	373	8.1%	37	121	158	None	Long-term OJT
51-9082	Medical Appliance Technicians	n	n	n	n	n	n	n	None	Long-term OJT
49-9044	Millwrights	110	122	12	10.9%	1	2	3	None	Apprenticeship
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	468	483	15	3.2%	2	11	13	None	Long-term OJT
51-9195	Molders, Shapers, and Casters, Except Metal and Plastic	333	308	-25	-7.5%	0	11	11	None	Long-term OJT
49-3051	Motorboat Mechanics and Service Technicians	201	208	7	3.5%	1	4	5	None	Long-term OJT
49-9063	Musical Instrument Repairers and Tuners	97	102	5	5.2%	0	2	2	None	Apprenticeship
51-8011	Nuclear Power Reactor Operators	n	n	n	n	n	n	n	None	Long-term OJT
29-2081	Opticians, Dispensing	501	617	116	23.2%	12	13	25	None	Long-term OJT
51-8093	Petroleum Pump System Operators, Refinery Operators, and Gaugers	n	n	n	n	n	n	n	None	Long-term OJT
27-4021	Photographers	521	529	8	1.5%	1	13	14	None	Long-term OJT
51-8099	Plant and System Operators, All Other	89	85	-4	-4.5%	0	3	3	None	Long-term OJT
47-2152	Plumbers, Pipefitters, and Steamfitters	1,776	1,903	127	7.2%	13	24	37	None	Apprenticeship
11-9131	Postmasters and Mail Superintendents	166	127	-39	-23.5%	0	4	4	< 5 years	Moderate OJT
51-8012	Power Distributors and Dispatchers	n	n	n	n	n	n	n	None	Long-term OJT
51-8013	Power Plant Operators	168	152	-16	-9.5%	0	6	6	None	Long-term OJT
49-9069	Precision Instrument and Equipment Repairers, All Other	143	146	3	2.1%	0	3	3	None	Long-term OJT
33-9021	Private Detectives and Investigators	60	64	4	6.7%	0	2	2	< 5 years	Moderate OJT
11-9141	Property, Real Estate, and Community Association Managers	1,074	1,190	116	10.8%	12	19	31	< 5 years	None
41-9021	Real Estate Brokers	317	323	6	1.9%	1	2	3	< 5 years	None
49-3092	Recreational Vehicle Service Technicians	107	109	2	1.9%	0	4	4	None	Long-term OJT
47-2171	Reinforcing Iron and Rebar Workers	n	n	n	n	n	n	n	None	Apprenticeship
25-3021	Self-Enrichment Education Teachers	1,585	1,894	309	19.5%	31	30	61	< 5 years	None
47-2211	Sheet Metal Workers	793	834	41	5.2%	4	17	21	None	Apprenticeship
51-8021	Stationary Engineers and Boiler Operators	86	83	-3	-3.5%	0	2	2	None	Long-term OJT
47-2022	Stonemasons	120	131	11	9.2%	1	1	2	None	Apprenticeship
47-2221	Structural Iron and Steel Workers	149	143	-6	-4.0%	0	2	2	None	Apprenticeship
49-9052	Telecommunications Line Installers and Repairers	545	540	-5	-0.9%	0	10	10	None	Long-term OJT
51-4111	Tool and Die Makers	352	319	-33	-9.4%	0	2	2	None	Long-term OJT
11-3071	Transportation, Storage, and Distribution Managers	359	370	11	3.1%	1	8	9	5+ years	None
49-9064	Watch Repairers	n	n	n	n	n	n	n	None	Long-term OJT
51-8031	Water and Wastewater Treatment Plant and System Operators	368	393	25	6.8%	2	9	11	None	Long-term OJT

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Source: Economic and Labor Market Information Bureau, New Hampshire Employment Security



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