Nondegree Credentials, Work-Based Learning, and the American Working Class

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Key Points

- Accounting for nondegree credentials and training—sub-baccalaureate certificates, industry certifications, professional licenses, work-experience programs, and apprenticeships—provides a more complete portrait of credential and skills attainment than regular measures of educational attainment do.
- Thirty-two percent of the working class—defined as adults 25–64 with a high school degree but no bachelor's degree and who reported incomes between $20,000 and $40,000—has a license, certification, or certificate. Surprisingly, nondegree credentials in health care are more common than credentials in the trades for working-class credential-holding adults, while credentials in the trades are more prevalent for upper-income credential-holding adults. This suggests that credentials in the trades may present viable pathways to higher earnings.
- Nondegree credentials and work-experience programs are often presented as alternatives to postsecondary education. However, these credentials and programs supplement college degrees for higher-educated adults more often than serving as alternatives to degrees for less-educated adults.

Technological advances and globalization are benefiting the economy at large. But along the way, many working-class Americans have experienced declines in position and prospects. Many jobs available to working-class adults in the past have disappeared, and the new and growing sectors and occupations seem to require more skills and education than before.[1]

For decades society has regarded a bachelor's degree from a traditional higher education institution as one of the surest paths to prosperity.[2] But a bachelor's degree program at a traditional college is not always the best option for everyone, nor is it the only avenue for people to receive training and skills that will pay off in the job market.[3] After years of policymakers and advocates advancing a broad "college for all" agenda, many Americans are questioning this sweeping and singular approach to human capital development.[4] Even so, it remains unclear what other viable education and training alternatives exist to build necessary skills and secure employment.

A broad spectrum of researchers and policy thinkers have argued for expanding alternatives to the traditional postsecondary system. Economist Harry Holzer argues that society must "offer students a wider range of high-quality pathways into the labor

market besides just [associate of arts] or [bachelor's of arts] programs by expanding effective career and technical education and apprenticeships."[5] Similarly, Andrew Kelly recommends that policymakers must "look beyond higher education as traditionally conceived—the two- or four-year degree-granting college—and create space for new options that can provide additional pathways to the middle class."[6]

These experts have in mind programs that offer components of a traditional degree program but that are shorter, more affordable, more skills- or work-intensive, and highly responsive to both trainees' and employers' needs. Their recommendations appear to be gaining traction on Capitol Hill, as evidenced by recent legislative proposals to expand federal funding for short-term training programs.[7]

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A high school degree no longer guarantees working-class adults sure footing in the labor market.[8] But a four-year college experience may seem too long, costly, or risky. If not a bachelor's degree program, then what other options can help working-class Americans get a leg up?

Community colleges offer two-year associate degree programs in technical and occupational fields that are associated with substantial earnings for graduates.[9] Less familiar, though, are the *nondegree credentials and work-based learning experiences* currently offered by community colleges, trade schools, private providers, four-year colleges, employers, and industry associations. These options include postsecondary certificates, industry certifications, professional licenses, work-experience programs, and apprenticeships. Individuals often earn these credentials in concert (e.g., a certificate program that includes work experience and leads to licensure).

Nondegree credentialing and training has existed for many years.[10] Reasons for pursuing nondegree education vary, from wanting to pick up in-demand skills, meet a job requirement, or get a pay raise to exploring a new occupational area or engaging in lifelong learning.[11] Having a nondegree credential is not unusual, either; one 2014 analysis by the US Census Bureau found that a quarter of all adults have a postsecondary certificate, industry certification, or professional license.[12] Until recently, however, nationally representative information on nondegree credentials and training opportunities was sparse, a result of the federal government's long-standing focus on traditional educational sectors and degrees.[13]

This report—commissioned by the Opportunity America–AEI–Brookings Institution Working Class Study Group—explores new data from the US Department of Education's 2016 Adult Training and Education Survey (ATES) on nondegree credentials and work-experience programs for American adults. The report describes the prevalence and characteristics of nondegree education for the working class and the adult population at large. It explores questions such as: How widespread is nondegree education? Do adults complete nondegree credentials instead of or in addition to college degrees? What occupational fields are most common for these credentials? Do completers view their credentials as useful for getting a job or increasing skills and pay?

Nondegree Credentials and Work-Experience Programs

Before exploring the landscape of nondegree credentials and work-experience programs, it is worth knowing more about them: Who awards them? How do they work? Are they considered valuable?

Postsecondary Certificates. Many degree-granting postsecondary institutions—especially community colleges and private vocational schools[14]—also confer certificates. Certificates come from completing programs of study similar to bachelor's or associate degrees, but they take less time to complete and focus more on occupational skills. Certificates typically take less than a year to complete, almost always less than two years.[15]

Certificates are the fastest-growing postsecondary credential since 2000, though the rate has decreased slightly in recent years.[16] In 2015–16, American higher education institutions conferred just under 939,000

certificates (compared to roughly 1.9 million bachelor's degrees and one million associate degrees).[17]

Certificates are frequently tied to a particular occupation. The most popular fields are health care, culinary services, and mechanic and repair technologies.[18] Examples include a sub-baccalaureate certificate in industrial production technologies or computer systems networking and telecommunications.

There is evidence of positive earnings outcomes associated with certificates, especially for fields such as STEM, nursing, and construction and for certificate holders working in the field in which their certificate was issued.[19] On the other hand, researchers have also found some certificate programs, such as those in business, humanities, or health or those offered by for-profit providers, to be of dubious worth, sometimes even making students worse off financially than they were before enrolling.[20]

Industry Certifications. Industry associations and private certifying bodies confer nondegree credentials called certifications. An industry certification signals that an individual has passed a formal examination demonstrating that he or she possesses the knowledge, skills, and competencies to perform a specific job.[21] The examination can be written, oral, or performance based. Participation in a formal education program is not always mandatory, depending on the certifying body. Many certifications must be renewed periodically.[22]

The Bureau of Labor Statistics (BLS) estimates that in 2017 about 3 percent of adults age 25 to 54 had an industry certification but no license.[23] Computers and mathematics; installation, maintenance, and repairs; and community and social services are the occupations with the greatest share of certified employees.[24] Examples of certifications include the Cisco Certified Network Associate, CompTIA Network+, and the American Welding Society certifications.

Although certifications are issued and validated by industry associations, not all are created equal. The US Department of Labor lists over 5,000 active certifications conferred by over 1,000 certifying bodies.[25] However, a 2017 study by Burning Glass Technologies analyzed a proprietary database of historical job postings and found that only about 100 industry certifications are specifically requested in the majority of online job postings, suggesting that a minority of certifications hold value with employers.[26] Nevertheless, the same Burning Glass analysis found certifications can carry significant salary premiums for entry-level workers in fields such as welding and information technology.[27]

Professional Licenses. Whereas postsecondary institutions offer certificates and industry associations confer certifications, governments—state boards, professional regulatory bodies, and others—issue licenses and mandate all employees in certain occupations earn and maintain the credential as a condition of working in the field. A government entity determines the criteria for licensure, which vary across jurisdictions and occupations. Criteria can include some combination of degree or nondegree credential attainment, hours of instruction, formal assessment, or work experience.[28] Licenses are time limited and must be renewed periodically.

The BLS estimated in 2017 that about 23 percent of adults age 25 to 54 have a professional license.[29] Health care, law, and education are some of the most heavily licensed occupations.[30]

There is extensive literature on the effects of professional licensure. It can raise wages and lower unemployment for licensed workers, but it has subsequent disadvantages for unlicensed workers and other negative effects on workers' mobility and consumer welfare.[31]

Work-Experience Programs. Industry associations and employers also facilitate training experiences. A work-experience program is broadly defined to include any type of training program with work-based learning, such as an internship, co-op, practicum, clerkship, externship, residency, clinical experience, or apprenticeship. Employers offer these programs on their own or with postsecondary programs or private training providers; postsecondary programs can offer them with employers as well (e.g., internships and externships).

One recent analysis by the US Department of Education finds that 65 percent of adult work-experience completers reported that their program was part of a postsecondary education program.[32] Work-experience programs can help participants prepare for a license or certification in a number of occupations. Roughly half of adults who have completed a work-experience program stated it helped them

earn a credential.[33] Work-experience programs are most common in health care, education, and construction.[34]

One well-studied type of work-experience program is formal on-the-job training. Although definitions of formal on-the-job training vary, they generally refer to a predetermined training regimen for hired employees led by an assigned instructor for a given duration of time.[35]

In this report, work-experience programs are more broadly defined: Participants need not be hired already nor must they have received formal instruction from a coworker or supervisor or through courses or seminars offered by an employer or industry association. Instead, work-experience programs include any program in which participants received some type of training while working in a job setting. Work-experience programs thus capture traditional, formal on-the-job training, but they also include other types of work-based learning of varying formality and structure (e.g., internships and externships).[36]

Apprenticeships. Apprenticeships are another well-defined type of work-experience program. Apprentices receive both on-the-job and in-classroom instruction in a specific occupational field for an extended period (typically four years[37]), during which firms pay apprentices a training wage.[38] Apprenticeships are usually designed for entry-level workers rather than seasoned employees and are oft considered an on-ramp to full-time, permanent employment.

The Department of Labor reports roughly 534,000 active participants in the federal Registered Apprenticeship program in 2017. Prior analyses estimate an additional 500,000 to one million active participants in "unregistered" apprenticeship programs that are outside the purview of the federal government.[39]

Many observers view apprenticeships as the gold standard of workforce training. One 2012 evaluation of the Department of Labor's Registered Apprenticeship program found that six years after completion the average annual earnings boost for participants was more than $6,500 higher than for demographically similar nonparticipants.[40]

Apprenticeships have traditionally had a working-class connotation. In the past, they most frequently prepared participants for blue-collar jobs such as electricians, carpenters, and construction craft laborers.[41] Despite their positive effects on employment and earnings, apprenticeships are regarded as costly and hard to scale and maintain a blue-collar stigma.[42]

Data and Methods

This report uses data from the public-use, nationally representative 2016 ATES, part of the US Department of Education's National Household Education Surveys. The ATES collects information from more than 47,000 adults age 16 to 65 who are not enrolled in high school.[43] The ATES is a new survey; the government released the data in February 2018.[44]

The ATES captures detailed information on nondegree credentials (e.g., postsecondary certificates, licenses, and certifications) and work-experience programs (e.g., apprenticeships, internships, residencies, and externships). It surveys the prevalence of these credentials and programs, the type of occupations and fields of study for which they are issued, and their perceived usefulness by completers, among several other relevant characteristics. While surveys from other federal agencies capture some similar information on the prevalence of nondegree credentials and more in-depth information on person-level characteristics of respondents,[45] the express focus of the ATES is nondegree education among the US adult population. The survey asks a variety of new questions on the characteristics of these credentials, which are not in other surveys.

The Opportunity America–AEI–Brookings Institution Working Class Study Group has interest in one particular segment of adults: the working class. The group defines the working class in terms of (1) educational attainment (at least a high school diploma, but less than a bachelor's degree) and (2) income (20th to 50th percentile of household income). For this report, the sample of working-class individuals is slightly modified, including adults age 25–64 with:

- At least a high school diploma or equivalent, but less than a bachelor's degree; and
- Annual individual income between $20,000 and $40,000.

The income definition is adjusted given limitations in person-level information collected by the ATES. It nevertheless still corresponds with the working

group's definition of household income, though estimates are slightly biased since the sample includes income reporters only.[46]

For comparison, I also identified a lower-income group that includes adults age 25–64 with annual individual incomes below $20,000 and an upper-income group of the same age range and incomes above $40,000. Given the context, in some parts of the analysis I restrict the two comparison groups to match the educational definition of the working-class group (i.e., a high school diploma, some college, or an associate degree). In other parts, I do not restrict the comparison groups.[47] Before each table or figure, relevant comparison groups are noted clearly.

The report exclusively explores the five types of nondegree credentials and work-based learning described above: (1) postsecondary certificates,[48] (2) industry certifications, (3) professional licenses, (4) work-experience programs, and (5) apprenticeships.[49] This report includes only the "most important" industry certification or professional license held by respondents, though it is certainly possible to have both credentials.[50] Apprenticeship is a subcategory of work-experience programs.

Findings

I first examine the nondegree attainment of the working-class population of adults. Afterward, I widen the analysis to explore the nondegree attainment of the working-class group in relation to the lower- and upper-income comparison groups and adults of all education and income levels.

Traditional Educational Attainment in the Working Class. While this report focuses on nondegree education for working-class adults, it is important to first establish baseline estimates of traditional educational attainment. That way we can see the extent to which nondegree education supplements overall working-class educational attainment.

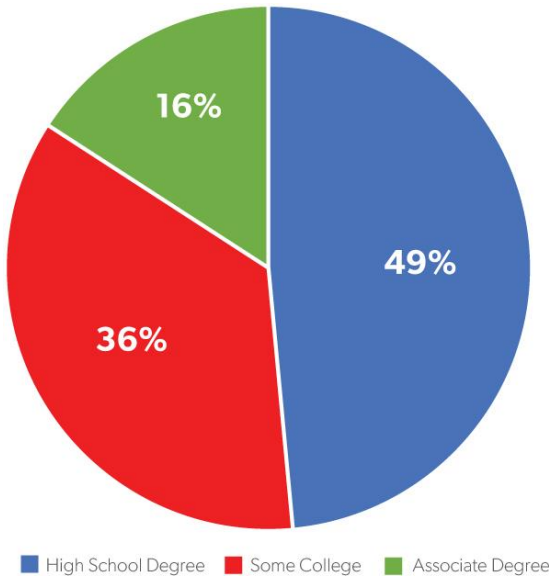
To start, Table 1 displays the educational attainment for adults age 25–64 with annual individual income between $20,000 and $40,000 (i.e., the income range for the working-class definition in this report). Twenty-four percent of adults in this income group have a bachelor's degree or higher. The majority have lower levels of educational attainment, with roughly two-thirds (65 percent) having

Table 1. Educational Attainment, Working-Class Adults Age 25–64

Educational Attainment	Percentage
Less Than High School	11%
High School Degree	32%
Some College	23%
Associate Degree	10%
Bachelor's Degree	18%
Graduate/ Professional Degree	6%

Note: This table includes adults age 25–64 with annual individual earnings of $20,000–$40,000. n = 8,067. Estimates are weighted and rounded to the ones place (though n's are unweighted). Note that findings are for income reporters only.
Source: Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

Figure 1. Share of Working-Class Adults Age 25–64 with High School Diploma, Some College, or Associate Degree



Note: This figure includes adults age 25–64 with annual individual earnings of $20,000–$40,000 with a high school diploma or equivalent, some college, or an associate degree. n = 5,248. Percentages do not sum to 100 percent because of rounding. Estimates are weighted and rounded to the ones place (though n's are unweighted). Note that findings are for income reporters only.
Source: Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

Table 2. Nondegree Attainment, Working-Class Adults Age 25–64

Nondegree Attainment	Postsecondary Certificate	Professional License	Industry Certification	Work-Experience Program	Apprenticeship
Percentage	16%	18%	4%	13%	1%

Note: This table includes adults age 25 to 64 with annual individual earnings of $20,000–$40,000 with a high school diploma or equivalent, some college, or an associate degree. n = 5,248. Estimates are weighted and rounded to the ones place (though n's are unweighted).

Source: Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

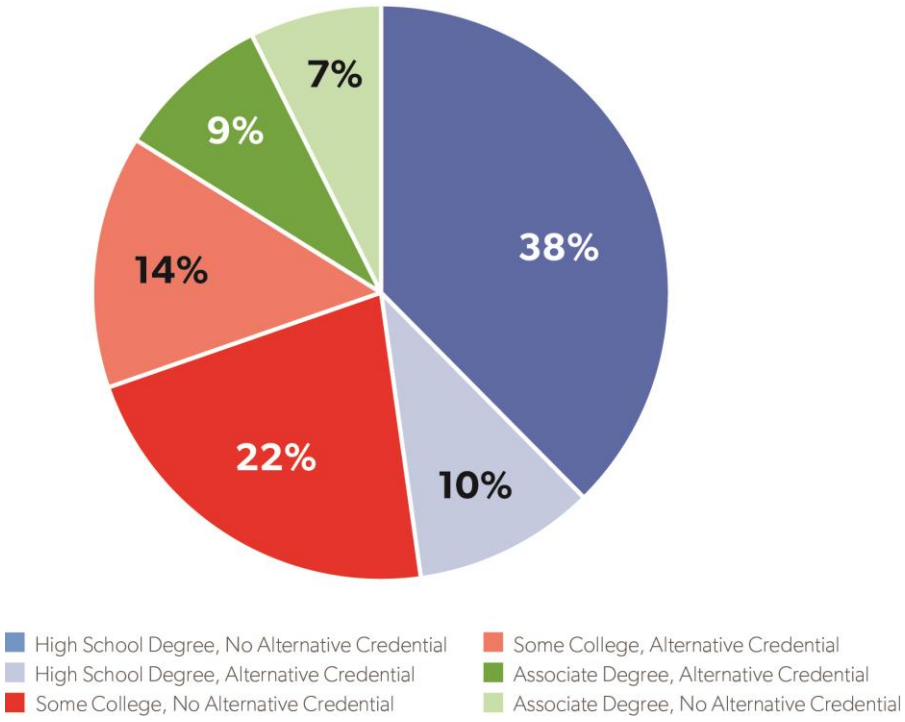
a high school degree, some college, or an associate degree.

Figure 1 further restricts the sample of working-class adults to include only those with at least a high school diploma but less than a bachelor's degree (i.e., the working group's definition). In this group, 49 percent of working-class adults have a high school diploma, 36 percent have some college experience, and 16 percent have an associate degree.

Nondegree Credentials and Work-Experience Programs in the Working Class. Figure 1 does not paint a full portrait of credential attainment for the working class. Working-class adults are also competing in the labor force with nondegree credentials such as certificates, certifications, or licenses, either in lieu of or in addition to a postsecondary degree. Table 2 displays the share of working-class adults who have completed nondegree credentials and work-experience programs. The categories are exclusive.

Professional licenses (18 percent), postsecondary certificates (16 percent), and work-experience programs (13 percent) are the most prevalent nondegree credentials or experiences among working-class adults. Industry certifications (4 percent) and apprenticeships (1 percent)—which are both commonly associated with working-class or blue-collar occupations—are least prevalent. No matter the category though, a minority of working-class adults have completed any of these nondegree credentials or work-experience programs.

Figure 2. Share of Working-Class Adults Age 25–64 with a High School Diploma, Some College, or an Associate Degree with and Without Nondegree Credentials



Note: This figure includes adults age 25–64 with annual individual earnings of $20,000–$40,000 with a high school diploma or equivalent, some college, or an associate degree. n = 5,248. Nondegree credentials include certificates, certifications, and licenses. Estimates are weighted and rounded to the ones place (though n's are unweighted).

Source: Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

At the same time, 32 percent of working-class adults (who report income) have a nondegree credential: a postsecondary certificate, certification, or license.[51] Figure 2 incorporates nondegree credentials into overall working-class educational attainment. It shows that 38 percent of the working class has a high school diploma only, but 10 percent has a high school education and some type of nondegree credential. Similarly, 22 percent has some college experience only, and 14 percent has some college experience plus a credential. Also, 9 percent has an associate degree only, with 7 percent

more having an associate degree with an alternative credential.

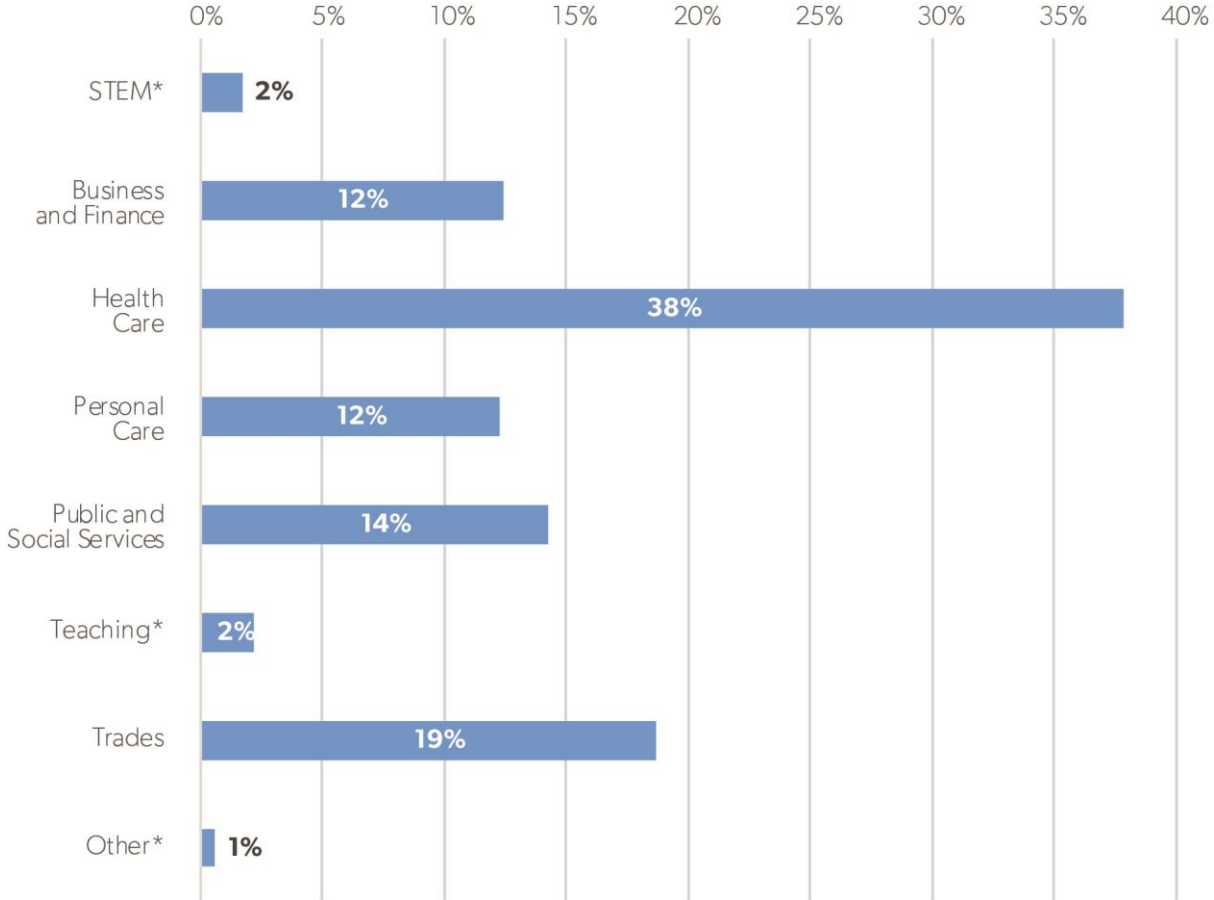
Traditional measures of educational attainment suggest that adults with a high school education or some college experience lack postsecondary credentials. Figure 2 shows that working-class adults are more credentialed than expected. It is still an open question, though, whether and to what extent those credentials are valuable.

Field of Study of Nondegree Education for the Working Class. Working-class adults have nondegree credentials for a variety of occupations, and credentialing is more common in some fields than others. The ATES allows one to document the field of study directly tied to nondegree credentials, as it contains an original coding taxonomy for certifications and licenses.[52] The survey collects similar information for postsecondary certificates. It captures work-experience programs by occupational field as well, but the classifications do not align well with those of other credentials. Therefore, work-experience programs are omitted from this portion of the analysis.[53]

Figure 3 shows the percentage distribution of working-class certification and license holders by the field of their credential.[54] Certifications and licenses are combined for statistical power because such a small slice of the working-class population has a certification and because they are substantively similar credentials.[55] For context, 18 percent of the working class holds a license, and 4 percent holds a certification.

More working-class certification and license holders have credentials in health care (38 percent) than other fields.[56] Within the health care category, a majority

Figure 3. Percentage Distribution of Industry Certifications and Professional Licenses by Field, Working-Class Credential Holders Age 25–64



Note: This figure includes adults age 25–64 with annual individual earnings of $20,000–$40,000 with a high school diploma or equivalent, some college, or an associate degree and either a certification or license. n = 1,021. Certifications and licenses are combined into one category for statistical power. For the full listing of occupational fields in each of the eight aggregated field of study categories, see endnote 53. Estimates are weighted and rounded to the ones place (though n's are unweighted). Detail may not sum to totals because of rounding. *Interpret with caution, as standard error is more than 30 percent of estimate.

Source: Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

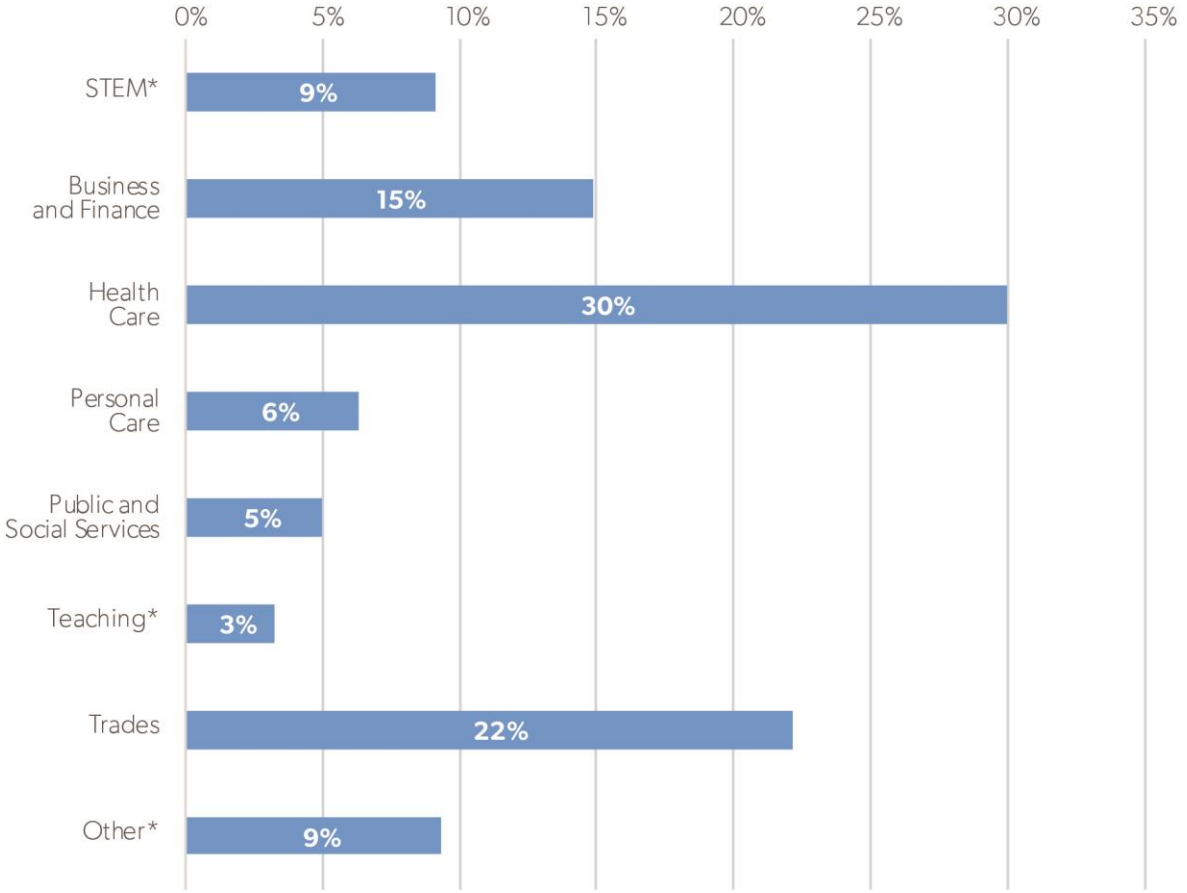
of credentials are in the "other health care" subcategory (additional subcategories: basic life support, nursing, and health care practitioner/provider).[57] "Other health care" represents credentials for fields such as emergency medical technicians, advanced life support, nursing specialties, medical therapy, or various technician occupations (e.g., phlebotomy, radiology, and ultrasound).[58]

Nearly twice as many working-class certification and license holders have credentials in health care than in the next largest category, the trades (19 percent). The trades is a broad category that includes vehicle maintenance/installation/repair, transportation or materials moving, and other trades. Of the working-class credential holders with certifications or licenses in the trades, a plurality of credentials are in transportation (e.g., commercial license driver, fire truck operator, and heavy equipment operator) and other trades (e.g., HVAC, building maintenance, welding, and CNC machining).[59]

Other notable fields in which the working class holds certifications and licenses include 14 percent in public and social services (e.g., legal services, public safety, social work, and environmental, water, and food safety), 12 percent in personal care (e.g., cosmetology and childcare), and 12 percent in business and finance (e.g., accounting, management or operations, insurance, and real estate).[60]

Figure 4 displays the percentage distribution of working-class postsecondary certificate holders by

Figure 4. Percentage Distribution of Postsecondary Certificates by Field, Working-Class Certificate Holders Age 25–64



Note: This figure includes adults age 25–64 with annual individual earnings of $20,000–$40,000 with a high school diploma or equivalent, some college, or an associate degree and a postsecondary certificate. n = 960. For the full listing of occupational fields within each of the eight aggregated field of study categories, see endnote 61. Estimates are weighted and rounded to the ones place (though n's are unweighted). Detail may not sum to totals because of rounding. *Interpret with caution, as standard error is more than 30 percent of estimate.

Source: Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

field.[61] For context, 16 percent of the working class has a postsecondary certificate. Among working-class certificate completers, 30 percent of certificates are in health care, 22 percent in trades, and 15 percent in business and finance. Certifications in health care are prevalent but not the most concentrated; the difference between health care and the trades is not statistically significant.

The majority of the working class' certificates in the trades are in construction and mechanic and repair technologies. The plurality of certificates in business and finance are in accounting, finance, insurance, or real estate.[62] The ATES does not specify subcategories for health care certificates.

Existing literature suggests that field matters greatly for the labor market outcomes associated with completing postsecondary credentials, though most studies focus on bachelor's or associate degrees.[63] For example, bachelor's degrees in fields such as chemical engineering have higher expected earnings than do degrees in the humanities or social work.[64] Later in the report, I compare the fields of study of nondegree credentials among the working class with those from similarly educated lower- and upper-income comparison groups. Differences between groups may shed some light on the value of nondegree credentials associated with certain fields.

Usefulness of Nondegree Education for the Working Class. One way to assess the value of credentials is by estimating the net returns associated with completing them. Another way is by asking credential holders whether they think their own credentials are valuable.

The ATES asked nondegree completers various questions about the usefulness of their credential or program: How useful was your most important credential for getting a job? How useful was your

Table 3. Nondegree Credential or Program Useful for Getting a Job?

Certifications/Licenses				Postsecondary Certificates				Work-Experience Programs			
Not Useful	Somewhat Useful	Very Useful	Too Soon	Not Useful	Somewhat Useful	Very Useful	Too Soon	Not Useful	Somewhat Useful	Very Useful	Too Soon
7%	15%	74%	4%	25%	30%	44%	2%	18%	26%	55%	2%

Note: This table includes adults age 25–64 with annual individual earnings of $20,000–$40,000 with a high school diploma or equivalent, some college, or an associate degree. For certifications and licenses, n = 1,021; for certificates, n = 960; for work-experience programs, n = 620. Estimates are weighted and rounded to the ones place (though n's are unweighted).

Source: Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

Table 4. Nondegree Credential or Program Useful for Increasing Skills?

Certifications/Licenses				Postsecondary Certificates				Work-Experience Programs			
Not Useful	Somewhat Useful	Very Useful	Too Soon	Not Useful	Somewhat Useful	Very Useful	Too Soon	Not Useful	Somewhat Useful	Very Useful	Too Soon
9%	24%	66%	1%	19%	31%	49%	1%	13%	29%	58%	0%

Note: This table includes adults age 25–64 with annual individual earnings of $20,000–$40,000 with a high school diploma or equivalent, some college, or an associate degree. For certifications and licenses, n = 1,021; for certificates, n = 960; for work-experience programs, n = 620. Estimates are weighted and rounded to the ones place (though n's are unweighted).

Source: Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

Table 5. Nondegree Credential or Program Useful for Keeping You Marketable or Increasing Your Pay?

Keeping You Marketable?				Increasing Your Pay?							
Certifications/Licenses				Postsecondary Certificates				Work-Experience Programs			
Not Useful	Somewhat Useful	Very Useful	Too Soon	Not Useful	Somewhat Useful	Very Useful	Too Soon	Not Useful	Somewhat Useful	Very Useful	Too Soon
8%	16%	72%	4%	46%	24%	28%	1%	37%	24%	36%	2%

Note: This table includes adults age 25–64 with annual individual earnings of $20,000–$40,000 with a high school diploma or equivalent, some college, or an associate degree. For certifications and licenses, n = 1,021; for certificates, n = 960; for work-experience programs, n = 620. Estimates are weighted and rounded to the ones place (though n's are unweighted).

Source: Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

Table 6. Educational Attainment by Income Group, Adults Age 25–64

	All Adults	Lower Income	Middle Income	Upper Income
Less Than High School	11%	16%	11%	3%
High School Degree	26%	32%	32%	16%
Some College	20%	22%	23%	16%
Associate Degree	9%	8%	10%	9%
Bachelor's Degree	23%	16%	18%	33%
Graduate/Professional Degree	12%	6%	6%	22%

Note: The lower-income group has annual individual earnings of $0–$20,000 (n = 6,310); the working-class group $20,000–$40,000 (n = 8,037); the upper-income group $40,000 and above (n = 17,819). "All adults" includes all income levels (n = 41,242). Detail may not sum to totals because of rounding. Estimates are weighted and rounded to the ones place (though n's are unweighted).

Source: Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

most important credential for increasing work skills? How useful was your most important credential for keeping you marketable or increasing your pay? These questions capture new information on the perceived value of nondegree credentials and experiences for working-class adults.

For Tables 3–5, certifications and licenses are again combined into one category. Work-experience programs are included and are not broken out into subcategories (e.g., apprenticeships). For context, 18 percent and 4 percent of the working class have completed a license or certification, respectively; 16 percent has completed a postsecondary certificate; and 13 percent has completed a work-experience program.

Table 3 displays the share of working-class completers who view their certification or license, postsecondary certificate, or work-experience program as very useful, somewhat useful, or not useful for getting a job (or "too soon to tell"). Most working-class certification and license holders (74 percent) find their credential "very useful" for getting a job—an unsurprising result, considering governments require licenses for employment in relevant fields. Fifty-five percent of work-experience completers view their work-experience program as very useful. A plurality of certificate completers (44 percent) view their certificate as "very useful," with another quarter of respondents viewing their certificate as "not useful."

Table 4 reveals similar patterns with nondegree credentials increasing work skills. Sixty-six percent of working-class completers view their certification or license as "very useful" for increasing their skills, and 58 percent of completers view their work-experience program similarly. Around half of completers view their postsecondary certificate as "very useful" for increasing skills.

Finally, the ATES asked certification and license holders whether their credential was useful for keeping them marketable in the labor force—a question not asked of other nondegree credentials. Table 5 shows that 72 percent of completers responded that their certification or license was very useful for staying marketable. This is also perhaps predictable, considering licenses are mandated and certifications and licenses often must be renewed.

The ATES also asked certificate holders and work-experience completers whether their credential or program was useful for increasing their pay.[65] Responses were more muted. Thirty-six percent of working-class completers viewed their work-experience program as "very useful" for increasing pay; 37 percent responded "not useful." Forty-six percent of certificate holders also view their certificate as "not useful" for increasing pay.

Beyond the Working Class: Nondegree Education for All Income Groups. After viewing the results for working-class adults, I now compare the nondegree attainment of working-class adults with that of lower- and upper-income comparison groups.

Table 6 displays traditional educational attainment for adults of all education levels broken out by income

groups. Note that the middle-income group is not the working-class group since it includes adults of all education levels. Overall, roughly 35 percent of all adults age 25–64 have completed a bachelor's degree or higher, and roughly 65 percent have an associate degree, some college experience, or less.[66]

Looking at differences among income groups, well over half the upper-income group possesses a bachelor's degree or higher, whereas just 24 percent of the middle-income group and almost 22 percent of the lower-income group have the same levels of educational attainment. Interestingly, the working class mostly resembles the lower-income group in educational attainment at any level; a majority of both the working class and the lower-income group has not attained any postsecondary degree.

Prevalence of Nondegree Credentials and Work-Experience Programs for All Income Groups. Figure 5 displays nondegree attainment across all income groups. The working-class category is restricted by educational attainment (a high school degree, some college, or an associate degree). The other comparison groups (lower income, upper income, and all adults) include adults of all education levels.

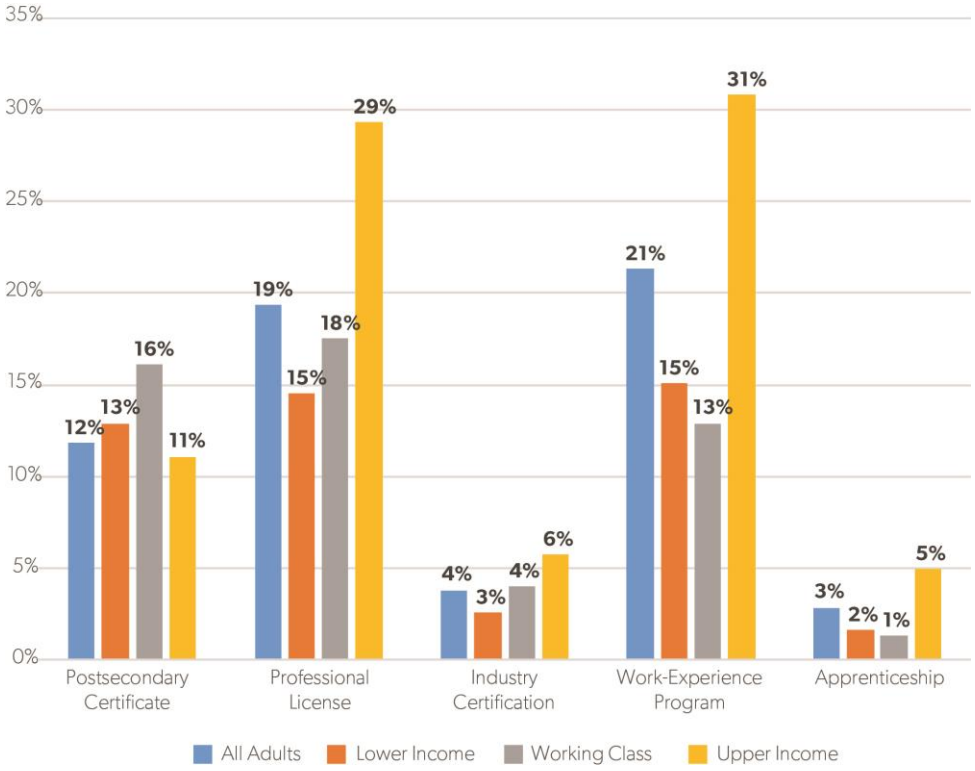
For all adults, professional licenses (19 percent) and work-experience programs (21 percent) are the most prevalent alternative credentials or experiences. Industry certifications (4 percent) and apprenticeships (3 percent) are least prevalent. Postsecondary certificates are the fastest-growing credential conferred by higher education institutions, but only 12 percent of adults have one.

One 2014 analysis by the US Census Bureau returned similar results. Stephanie Ewert and Robert Kominski analyzed the 2008 Survey of Income and Program Participation and found that, for adults age 18 and over, 21.6 percent held a professional license or certification and 8.9 percent possessed a postsecondary educational certificate.[67]

Figure 5 also displays the nondegree attainment of the working class in relation to adults in other income groups. The working class is more likely to hold a postsecondary certificate than all other groups.[68] For licenses and certifications, the share of working-class adults sits between that of lower- and upper-income adults.

Most striking is the higher share of upper-income adults who have completed any kind of qualification (except certificates): professional license (29 percent), work-experience program (31 percent), industry certification (6 percent), and apprenticeship (5 percent). Since

Figure 5. Nondegree Attainment by Income Group and All Adults, Age 25–64



Note: Adults are age 25 to 64. "All adults" includes all income and education levels (n = 41,242). The lower-income group has annual individual earnings of $0–$20,000 (n = 6,310); the working-class group $20,000–$40,000 (n = 5,248); the upper-income group $40,000 and above (n = 17,819). Educational attainment for the working-class groups includes only high school, some college, or an associate degree; educational attainment for lower- and upper-income includes all levels. Estimates are weighted and rounded to the ones place (though n's are unweighted).

Source: Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

Table 7. Level of Educational Attainment, Adults Age 25–64

	Postsecondary Certificate	Industry Certification	Professional License	Work-Experience Program	Apprenticeship
Less Than High School	3%	1%	4%	3%	0%
High School Degree	11%	2%	10%	6%	1%
Some College	24%	4%	18%	13%	2%
A.A./A.S.	21%	6%	27%	26%	3%
Bachelor's Degree	8%	5%	24%	35%	4%
Graduate/ Professional Degree	4%	5%	43%	56%	7%

Note: Rows and columns do not sum to 100 percent. Estimates are weighted and rounded to the ones place. Unweighted n = 41,242, including less than high school degree (n = 2,709), high school degree (n = 9,248), some college (n = 8,757), associate (n = 3,954), bachelor's (n = 9,958), and professional (n = 6,613).

Source: Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

well over half the upper-income group has completed a college degree, this finding suggests a strong association between degree attainment and nondegree attainment.

To explore this association, Table 7 displays the share of all adults age 25–64 at each level of traditional educational attainment who have completed any type of nondegree credential or work-experience program. The main takeaway: A modest share of less-educated adults supplement traditional educational experiences, high school or postsecondary, with nondegree alternatives, while a much greater share of highly educated adults complement their degrees with nondegree credentials or work experiences.

Table 7 shows that adults with lower levels of education modestly supplement their educational experiences, or lack thereof, with certain types of nondegree education. For example, adults further down the educational spectrum are more likely to hold a postsecondary certificate than more highly educated adults are. Eleven percent of high school graduates have a postsecondary certificate, as do 24 percent and 21 percent of some college and associate degree holders, respectively. In comparison, a relatively smaller share of bachelor's (8 percent) and advanced degree holders (4 percent) also have sub-baccalaureate certificates.

Additionally, of the adults with some college experience, 18 percent have completed licenses and 13 percent work-experience programs. Six percent of associate degree holders have an industry certification, and over a quarter have a license (27 percent) or have completed some type of work-experience program (26 percent). Adults with lower levels of education are pursuing alternative credentials or work experiences to some extent.

On the other hand, highly educated adults are just as likely to have industry certifications and are much more likely to have completed licenses and work-experience programs. Not only do these adults have the primary ticket to the middle class—the bachelor's degree—but they are likely to have complemented their education with additional credentials or professional training experiences.

For instance, 43 percent of advanced degree holders have a professional license, compared to 18 and 10 percent of adults with some college or a high school diploma. A striking 56 and 35 percent of advanced degree and bachelor's degree holders have completed a work-experience program, compared to 13 and 6 percent of adults with some college or high school diplomas.[69] Even apprenticeships are more prevalent among the highly educated (7 percent of advanced degree holders and 4 percent of bachelor's degree holders), though the ATES measures the category more broadly than prior surveys have.[70]

Despite the general association between educational attainment and nondegree attainment, the question remains whether nondegree credentials are valuable alternatives for working-class adults. The working class by definition has lower levels of

educational attainment, and Table 5 shows that less-educated adults supplement their education with nondegree credentials at generally modest rates. Are there earnings gains for less-educated, working-class adults with nondegree credentials?

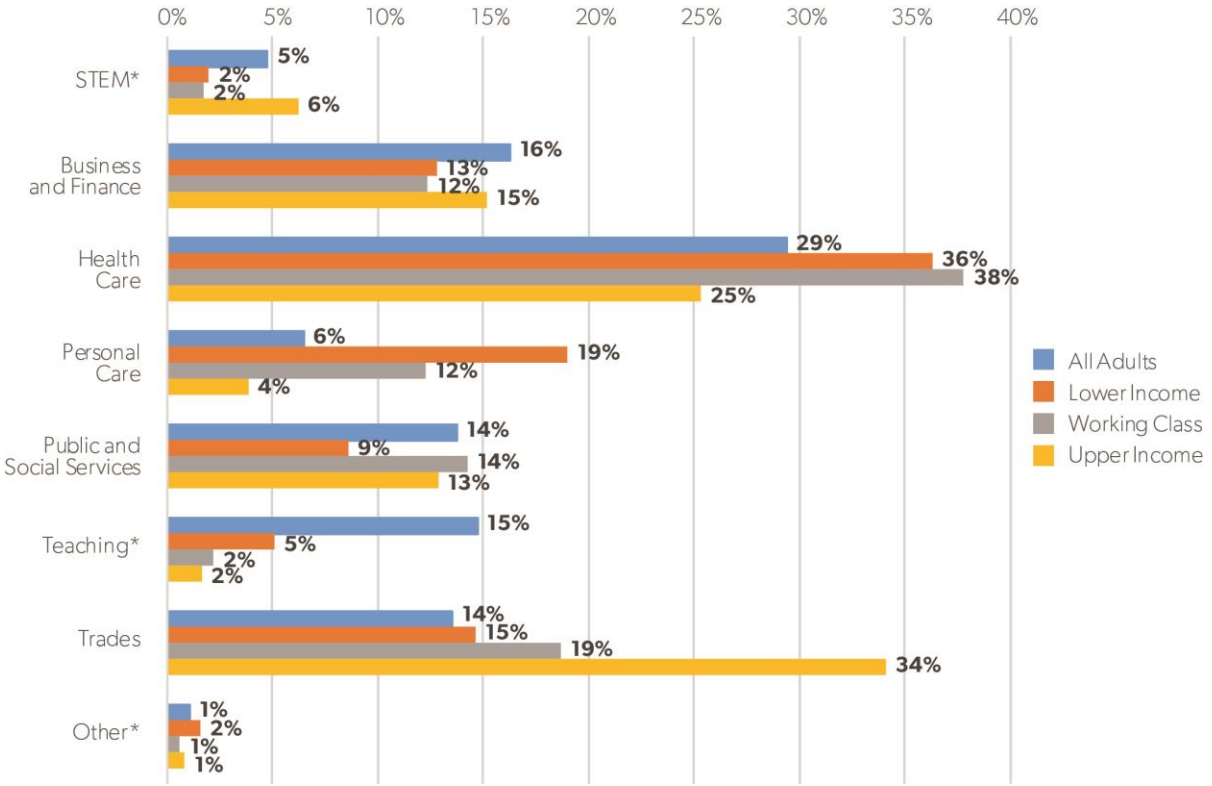
This report does not attempt to estimate any earnings effects for nondegree credentials. But prior research shows some evidence of earnings premiums for less-educated adults with nondegree credentials. The US Census Bureau found:

> Professional certification or license holders earned more than those without an alternative credential at each level of education below the bachelor's degree. Among people with some college but no degree or less, educational certificate holders also earned more than people without an alternative credential.[71]

The most recent BLS data also show higher median weekly earnings for adults with certifications or licenses at each level of education less than a bachelor's degree than for adults without certifications or licenses at similar educational levels.[72] Furthermore, a recent analysis of the ATES by researchers from New America finds that adults without bachelor's degrees but with nondegree credentials are more likely to be employed and earn more money than adults without a nondegree credential, albeit with significant disparities in earnings by gender and occupational area.[73]

The next two sections explore two characteristics of nondegree credentials—occupational field and perceived usefulness—across income groups for

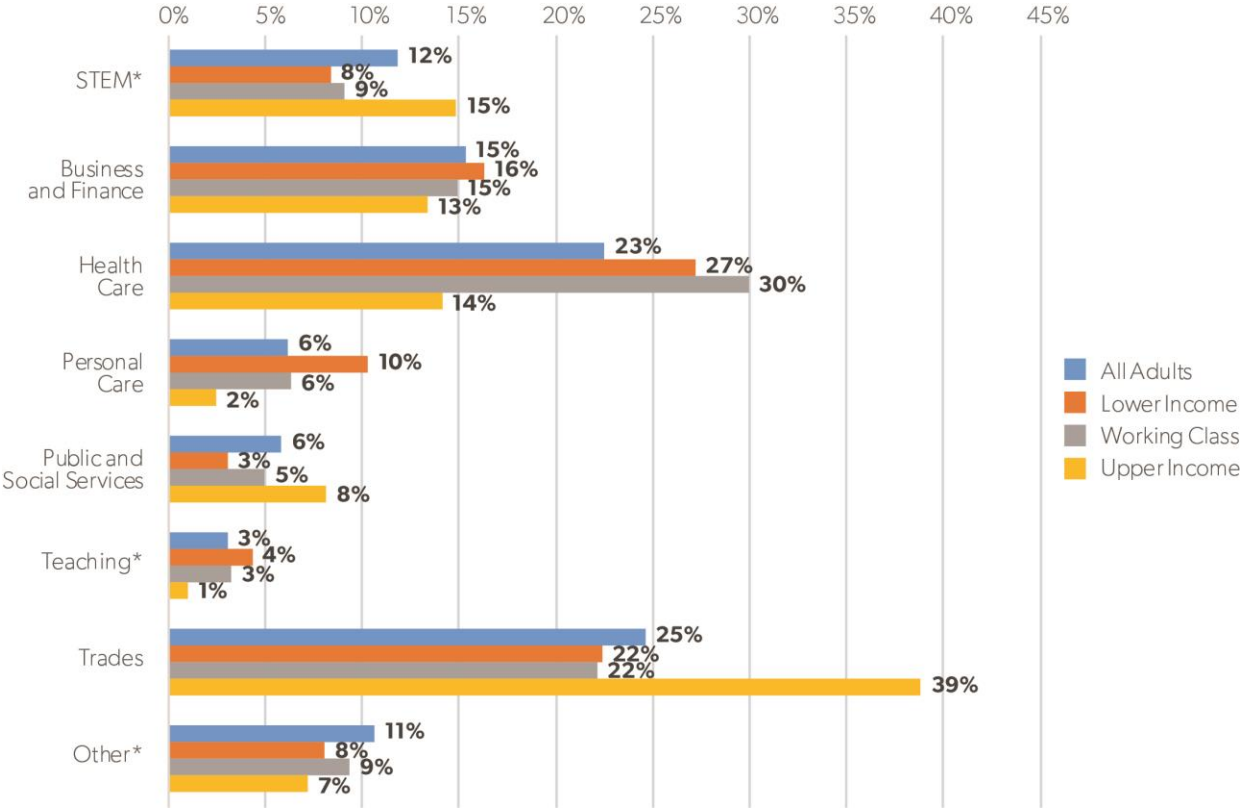
Figure 6. Percentage Distribution of Industry Certifications and Professional Licenses by Field and Income Group



Note: This figure includes adults age 25–64 with a high school diploma, some college, or an associate degree. The lower-income group has annual individual earnings of $0–$20,000 (n = 727); the working-class group $20,000–$40,000 (n = 1,021); the upper-income group $40,000 and above (n = 1,964). Educational attainment for all income groups includes only high school, some college, or an associate degree. "All adults" is unrestricted by income and education (n = 10,237). Estimates are weighted and rounded to the ones place (though n's are unweighted). Detail may not sum to totals because of rounding. See endnote 53 for the full listing of occupational fields within each of the eight aggregated field of study categories. *Interpret with caution, as standard error is more than 30 percent of estimate.

Source: Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

Figure 7. Percentage Distribution of Postsecondary Certificates by Field and Income Group



Note: This figure includes adults age 25–64 with a high school diploma, some college, or an associate degree. The lower-income group has annual individual earnings of $0–$20,000 (n = 783); the working-class group $20,000–$40,000 (n = 960); the upper-income group $40,000 and above (n = 1,413). Educational attainment for all income groups include only high school, some college, or an associate degree. "All adults" is unrestricted by income and education (n = 5,488). Estimates are weighted and rounded to the ones place (though n's are unweighted). Detail may not sum to totals because of rounding. See endnote 61 for the full listing of occupational fields within each of the eight aggregated field of study categories. *Interpret with caution, as standard error is more than 30 percent of estimate.

Source: Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

adults with a high school diploma, some college, or an associate degree. This information may give some indications as to which types of nondegree credentials must be more valuable than others for less-educated adults, including the working class.

Field of Study of Nondegree Education for All Income Groups. Figure 6 shows the percentage distribution of certification and license holders by field for all income groups. Figure 7 displays the same but for postsecondary certificates. Work-experience programs are again omitted. Results for the income groups (lower income, working class, and upper income) are for adults with only a high school diploma, some college, or an associate degree. The "all adults" category includes all education and income levels and is included only as a reference point.

The main takeaway from both figures is that upper-income adults are more likely to have credentials in the trades or STEM, whereas working-class and lower-income adults are more likely to have credentials in health care. This suggests nondegree credentials in the trades and STEM may be more valuable than other fields of study for adults with lower levels of traditional education.

Figure 6 shows that upper-income adults with certifications or licenses are more likely to have a credential in the trades (34 percent) than in other fields, a higher rate than that of the other income groups. Within the trades category for each group, a plurality of upper-income adults have credentials in construction, and a plurality of working-class adults have credentials in transportation and materials moving.[74]

On the other hand, working-class and lower-income adults have credentials most concentrated in health care (38 and 36 percent, respectively), both higher shares than the upper-income group. Within the health care category, a majority of working-class adults and upper-income adults are most likely to be credentialed health care aides, though perhaps in different types of roles.[75] The lower-income group was also disproportionately more likely than other groups to hold certifications or licenses in personal care (19 percent), a category largely comprised of cosmetology and childcare credentials.

Now look at certificates. As is the case for certifications and licenses, Figure 7 shows that upper-income adults with postsecondary certificates are most likely to have certificates in the trades (39 percent), a much higher proportion than for working-class and lower-income adults. The share of certificates in STEM (15 percent) is higher for upper-income adults than for the other groups as well.

On the other hand, a substantial proportion of the working class (30 percent) and the lower-income group (27 percent) has certificates in health care fields. The share of certificates in health care for the working-class and lower-income groups is higher than that of the upper-income group. But within the working-class and lower-income groups, the share of health care certificates was not significantly different from the trades.

Major or occupational field matters a great deal for labor market outcomes for traditional postsecondary education, and programs in technical fields often deliver higher returns than other majors.[76] Prior research indicates that certificates are often most lucrative in technical fields. For instance, the Georgetown Center on Education and the Workforce notes that three of the top five certificate fields by earnings premium are in STEM: computer and information services, aviation, and electronics. For male certificate holders, the most lucrative certificates are in refrigeration, heating, or air conditioning; drafting; aviation; and electronics.[77] Similarly, the recent New America analysis of the ATES reveals that a substantial share of adults with nondegree credentials in occupations such as computer, construction, STEM, and architecture-related occupations have annual individual earnings above $50,000 and those fields have predominantly male employees.[78] In step with that research, Figures 6 and 7 demonstrate that upper-income adults with nondegree credentials are more likely to hold these credentials in the trades and STEM.

One possible reason for this finding: Nondegree credentials may be more valuable in technical fields than credentials in other fields, being associated with higher earnings for adults with lower levels of educational attainment. And nondegree credentials in the trades (construction, automotive, and transportation) may be significantly more valuable than commonly understood, such that adults who complete them might actually earn their way out of the working class as it is defined in this analysis.

Usefulness of Nondegree Credentials and Work-Experience Programs for All Income Groups. Tables 8–10 show how adults across income groups perceive the usefulness of nondegree credentials and work-experience programs. Results for the income

Table 8. Nondegree Credential Useful for Getting a Job?

	Certifications/Licenses				Postsecondary Certificates				Work-Experience Programs			
	Not Useful	Somewhat Useful	Very Useful	Too Soon	Not Useful	Somewhat Useful	Very Useful	Too Soon	Not Useful	Somewhat Useful	Very Useful	Too Soon
Lower Income	8%	16%	74%	2%	32%	26%	38%	5%	19%	26%	49%	6%
Working Class	7%	15%	74%	4%	25%	30%	44%	2%	18%	26%	55%	2%
Upper Income	7%	10%	80%	4%	14%	23%	60%	3%	8%	18%	73%	1%
All Adults	6%	11%	80%	3%	24%	26%	46%	4%	12%	22%	63%	3%

Note: Adults are age 25 to 64. For certifications and licenses, n = 1,021; for certificates, n = 960; for work-experience programs, n = 620. Estimates are weighted and rounded to the ones place. The lower-income group has annual individual earnings of $0–$20,000; the working-class group $20,000–$40,000; the upper-income group $40,000 and above. Educational attainment for all income groups includes only high school, some college, or an associate degree. "All adults" includes respondents of all income and educational attainment levels. Estimates are weighted and rounded to the ones place (though n's are unweighted).

Source: Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

groups again are only for adults with a high school diploma, some college, or an associate degree. Work-experience programs are included but not broken into subcategories (e.g., apprenticeships). The "all adults" category includes all education and income levels, only as a reference.

Across the board, upper-income adults are more likely than the working-class or lower-income groups to view their credentials as "very useful." And, generally speaking, credential-holding adults consider their certifications and licenses more useful than work-experience programs and postsecondary certificates. In fact, many low-income and working-class postsecondary certificate holders view their certificate as "not useful."

Table 8 displays the share of adults with low to middle levels of education and a nondegree credential who view their certification or license, postsecondary certificate, or work-experience program as useful for getting a job. The left panel reveals that a clear majority of certification and license holders across all income groups view their credential as very useful. This may be unsurprising since licenses are mandated for employment. The right panel shows that 73 percent of the upper-income group view their work-experience program as very useful for getting a job, as do 55 percent of working-class respondents and 49 percent of the lower-income group. Postsecondary certificates elicit less enthusiastic responses: 60 percent of upper-income respondents report

Table 9. Nondegree Credential Useful for Increasing Skills?

	Certifications/Licenses				Postsecondary Certificates				Work-Experience Programs			
	Not Useful	Somewhat Useful	Very Useful	Too Soon	Not Useful	Somewhat Useful	Very Useful	Too Soon	Not Useful	Somewhat Useful	Very Useful	Too Soon
Lower Income	12%	25%	62%	1%	22%	27%	47%	3%	14%	28%	54%	4%
Working Class	9%	24%	66%	1%	19%	31%	49%	1%	13%	29%	58%	0%
Upper Income	8%	21%	71%	0%	9%	27%	62%	1%	6%	19%	75%	0%
All Adults	10%	24%	65%	1%	16%	29%	54%	2%	7%	27%	65%	1%

Note: Adults are age 25 to 64. For certifications and licenses, n = 1,021; for certificates, n = 960; for work-experience programs, n = 620. Estimates are weighted and rounded to the ones place. The lower-income group has annual individual earnings of $0–$20,000; the working-class group $20,000–$40,000; the upper-income group $40,000 and above. Educational attainment for all income groups includes only high school, some college, or an associate degree. "All adults" includes respondents of all income and educational attainment levels. Estimates are weighted and rounded to the ones place (though n's are unweighted).

Source: Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

Table 10. Nondegree Credential Useful for Keeping You Marketable or Increasing Your Pay?

	Keeping You Marketable?				Increasing Your Pay?							
	Certifications/Licenses				Postsecondary Certificates				Work-Experience Programs			
	Not Useful	Somewhat Useful	Very Useful	Too Soon	Not Useful	Somewhat Useful	Very Useful	Too Soon	Not Useful	Somewhat Useful	Very Useful	Too Soon
Lower Income	9%	18%	71%	2%	48%	26%	22%	4%	43%	22%	28%	7%
Working Class	8%	16%	72%	4%	46%	24%	28%	1%	37%	24%	36%	2%
Upper Income	4%	12%	83%	1%	30%	29%	39%	2%	25%	21%	54%	0%
All Adults	5%	13%	80%	2%	41%	26%	29%	4%	36%	24%	36%	3%

Note: Adults are age 25 to 64. For certifications and licenses, n = 1,021; for certificates, n = 960; for work-experience programs, n = 620. Estimates are weighted and rounded to the ones place. The lower-income group has annual individual earnings of $0–$20,000; the working-class group $20,000–$40,000; the upper-income group $40,000 and above. Educational attainment for all income groups includes only high school, some college, or an associate degree. "All adults" includes respondents of all income and educational attainment levels. Estimates are weighted and rounded to the ones place (though n's are unweighted).

Source: Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

their certificate as very useful for getting a job, but only 44 percent of working-class respondents and 38 percent of the lower-income group do.

Table 9 reveals similar patterns regarding the perceived utility of nondegree credentials and work experiences. A clear majority of upper-income respondents report that their certifications or licenses (71 percent), work-experience programs (75 percent), and postsecondary certificates (62 percent) are very useful for increasing their skills. Generally, a plurality of working-class and lower-income respondents report that their credentials were very useful for enhancing their skills.

Finally, the ATES asked certification and license holders whether their credential was useful for keeping them marketable in the labor force. Table 10 shows that respondents continued to reply emphatically that their credentials were very useful—83 percent for upper income, 72 percent for the working class, and 71 percent for lower income. This again may be unsurprising as licenses are mandated for employment.

The ATES also asked certificate holders and work-experience program completers whether their credential or program was useful for increasing their pay. Responses to this question were more restrained. Among upper-income respondents, 39 percent answered that their postsecondary certificate was "very useful" for increasing pay, compared to only 29 percent for all adults. Similarly, 54 percent of upper-income respondents said their work-experience program was "very useful," compared to only 36 percent for all adults. However, a general plurality of working-class and lower-income respondents said that certificates (46 percent and 48 percent, respectively) and work-experience programs (37 percent and 43 percent, respectively) were "not useful."

Discussion

This report's findings paint a broad picture of nondegree educational attainment for American adults, especially the working class. Working-class credential attainment is higher when accounting for nondegree education, and 32 percent of working-class adults (who report an income) have a certificate, certification, or professional license. At the same time, a minority of the working class has completed any one type of nondegree credential or work-experience program.

A common perception is that individuals most often pursue nondegree education as an alternative to postsecondary education. This report suggests that this is just one of several paths.

The report examines adults at each level of traditional educational attainment who have completed a nondegree credential. It shows that lesser-educated adults have completed some type of nondegree education generally at low to modest rates. This group of adults includes welders, paramedics, dental assistants, and licensed hairdressers.

On the other hand, highly educated adults have generally completed nondegree credentials or work-experience programs at much higher rates. These adults are cardiovascular surgeons, licensed architects, and chartered financial analysts—individuals who have completed extensive postsecondary education, as well as complementary credentials or professional training experiences.

The highest-educated Americans clearly have opportunities—or requirements—to top off their degrees with credentials or work-based learning experiences. The challenge for policy is helping foster more valuable alternatives to postsecondary education for the less educated, those who are most in need of the potential earnings gains that come with enhanced skills, potentially garnered through nondegree educational options.[79] Not all nondegree education is created equal, though. For instance, many low-income and working-class adults did not find their postsecondary certificates or work-experience programs useful for increasing pay. It is simultaneously worth considering the utility of credential requirements (e.g., licensure) in certain occupational areas.

Educators should consider ways to incorporate or support opportunities for industry certifications and work-based learning for learners with less formal education. A number of community college systems have started down this road—developing new apprenticeship programs with local employers and embedding industry certifications in existing degree programs—to varying degrees of success.[80] New private-sector skills-training providers are offering quick and affordable avenues to employment as well.[81] Employers must be active participants in these reforms and, where possible, should consider developing more in-house training opportunities for entry-level and less-educated employees.[82]

Policymakers should consider expanding federal financial aid to a wider range of short-term, nondegree training programs. But, again, not all nondegree credentials or programs are of equal standing. If policymakers are intent on opening up federal dollars, then they must pair reforms with sufficient quality-assurance measures—including more robust consumer information and accountability provisions—to ensure they are supporting access to worthwhile credentials and training opportunities.[83]

One compelling finding is that the nondegree credentials completed by the working class were highly concentrated in health care, not the trades. On the other hand, upper-income adults (with no college degree) are more likely than the working class to have credentials in the trades, despite the working-class or blue-collar connotation of those fields. One possible interpretation: Nondegree credentials tied to these occupations represent more viable pathways to higher earnings than previously understood.

As prior research on associate and bachelor's degrees shows, field of study matters greatly regarding earnings for completers, and programs in technical fields often deliver higher returns than other majors do. Extending this argument, albeit acknowledging the limitations of point-in-time descriptive analysis, this report suggests that nondegree credentials in the trades and STEM are likely more valuable than other fields. But more in-depth research is needed on the returns to nondegree education—especially for industry certifications and work-experience programs—over time, by field of study, in relation to educational attainment, and accounting for various person-level characteristics.

Finally, make note of the adults who are not heard from in this report. The analysis presents findings for completers of nondegree credentials and training. But we also need more information about those who have not pursued or completed nondegree credentials or work-based learning programs and how their characteristics differ from completers. A more thorough study of nondegree education would account for a wider range of characteristics of credential holders versus non-credential holders (e.g., by age, gender, and race) over time and at each level of educational attainment through more complex methods, especially if measuring their returns.

Also, crucially, this report drops adults who do not report annual individual income. In other words, it analyzes the members of the working class who are *working*. But many of the omitted adults may (or may not) have nondegree credentials. Knowing more information about that group would further round out the analysis. Indeed, more research on all aspects of nondegree education is necessary, especially as policy debates around expanding access to short-term training programs persist.

About the Author

Rooney Columbus is a doctoral student at the University of Michigan and the former program manager for domestic policy studies at AEI.

Notes

1. See Harry Holzer, *Job Market Polarization and U.S. Worker Skills: A Tale of Two Middles*, Brookings Institution, April 2015, www.brookings.edu/wp-content/uploads/2016/06/polarization_jobs_policy_holzer.pdf.
2. See Jaison R. Abel and Richard Deitz, "Do the Benefits of College Still Outweigh the Costs?," Federal Reserve Bank of New York, 2014, www.newyorkfed.org/medialibrary/media/research/current_issues/ci20-3.pdf; Hamilton Project, "Return on Investment to a Bachelor's Degree," January 15, 2013, www.hamiltonproject.org/charts/return_on_investment_to_a_bachelors_degree; and Douglas A. Webber, "Are College Costs Worth It? How Individual Ability, Major Choice, and Debt Affect Optimal Schooling Decisions," *Economics of Education Review* 53 (August 2016): 296–310.
3. See Anthony P. Carnevale, Tamara Jayasundera, and Andrew R. Hanson, *Career and Technical Education: Five Ways That Pay Along the Way to the B.A.*, Georgetown Center on Education and the Workforce, September 2012, https://1gyhoq479ufd3yna29x7ubjn-wpengine.netdna-ssl.com/wp-content/uploads/2014/11/CTE.FiveWays.FullReport.pdf; and Mark Schneider and Rooney Columbus, *Degrees of Opportunity: Lessons Learned from State-Level Data on Postsecondary Earnings Outcomes*, American Enterprise Institute, October 20, 2017, www.aei.org/publication/degrees-of-opportunity-lessons-learned-from-state-level-data-on-postsecondary-earnings-outcomes/.

4. For example: "A slim plurality of Americans, 49% believes earning a four-year degree will lead to a good job with higher lifetime earnings, compared with 47% who don't. . . . The shift was almost entirely due to growing skepticism among Americans without four-year degrees—those who never enrolled in college, who took only some classes or who earned a two-year degree." Josh Mitchell and Douglas Belkin, "Americans Losing Faith in College Degrees, Poll Finds," *Wall Street Journal*, September 7, 2017, www.wsj.com/articles/americans-losing-faith-in-college-degrees-poll-finds-1504776601. Also: "In the last seven years, Americans have grown more pessimistic about the power of education to lead to success. Even though they see going to college as a fairly achievable goal, a majority—52 percent—think that young people do not need a four-year college education in order to be successful, compared to 44 percent when the same question was posed in 2009." Lauren Cassani Davis, "Do Americans Believe Hard Work Still Matters?," *Atlantic*, January 28, 2016, www.theatlantic.com/business/archive/2016/01/american-dream-heartland-poll/431586/.

5. Harry Holzer, "What Do State-Level College and Labor Market Data Teach Us About Higher Education Policy?," American Institutes for Research, June 23, 2015, www.air.org/resource/what-do-state-level-college-and-labor-market-data-teach-us-about-higher-education-policy.

6. Andrew P. Kelly, "Big Payoff, Low Probability: Postsecondary Education and Upward Mobility in America," in *Education for Upward Mobility*, ed. Michael J. Petrilli (Washington, DC: Rowman & Littlefield, November 2015), 43.

7. Paul Fain, "Support Grows for Major Shift in Pell," *Inside Higher Ed*, July 10, 2017, www.insidehighered.com/news/2017/07/10/support-builds-expanding-pell-eligibility-short-term-certificates; and US House of Representatives, Committee on Education and the Workforce, "PROSPER Act: Bill Summary," January 2018, https://edworkforce.house.gov/uploadedfiles/the_prosper_act_-_short_summary_-_1.17.18.pdf.

8. See Anthony P. Carnevale, Nicole Smith, and Jeff Strohl, *Help Wanted: Projections of Jobs and Education Requirements Through 2018*, Georgetown Center on Education and the Workforce, June 2010, https://cew.georgetown.edu/wp-content/uploads/2014/12/HelpWanted.ExecutiveSummary.pdf; William C. Symonds, Robert Schwartz, and Ronald F. Ferguson, *Pathways to Prosperity: Meeting the Challenge of Preparing Young Americans for the 21st Century*, Harvard University Graduate School of Education, February 2011, www.gse.harvard.edu/sites/default/files/documents/Pathways_to_Prosperity_Feb2011-1.pdf; and Holzer, *Job Market Polarization and U.S. Worker Skills*.

9. Mark Schneider, "A Bachelor's Degree Isn't the Only Path to Good Pay," *Wall Street Journal*, June 3, 2015, www.wsj.com/articles/a-bachelors-degree-isnt-the-only-path-to-good-pay-1433372775; and Harry J. Holzer and Sandy Baum, *Making College Work: Pathways to Success for Disadvantaged Students* (Washington, DC: Brookings Institution Press, 2017).

10. See Jessie Brown and Martin Kurzweil, *The Complex Universe of Alternative Postsecondary Credentials and Pathways*, Ithaka S+R, 2017, https://amacad.org/multimedia/pdfs/publications/researchpapersmonographs/CFUE_Alternative-Pathways/CFUE_Alternative-Pathways.pdf; and Michelle Van Noy et al., *The Landscape of Noncredit Workforce Education: State Policies and Community College Practices*, Community College Research Center, Teachers College, Columbia University, January 2008, https://ccrc. tc.columbia.edu/media/k2/attachments/noncredit-workforce-education-policy-practice.pdf.

11. Stephanie Cronen and Christina Murphy, *Participation in Noncredit Occupational Education and Training*, American Institutes for Research, February 2013, https://nces.ed.gov/surveys/gemena/pdf/NoncreditPaper_AIR_Final508.pdf.

12. Stephanie Ewert and Robert Kominski, "Measuring Alternative Educational Credentials: 2012," US Census Bureau, January 2014, www.census.gov/prod/2014pubs/p70-138.pdf.

13. See US Department of Education, Institute of Education Sciences, National Center for Education Statistics, *The Adult Training and Education Survey (ATES) Pilot Study: Technical Report*, April 2013, iii, https://nces.ed.gov/pubs2013/2013190.pdf.

14. As of 2012, community colleges award 52 percent of certificates, and private vocational schools award 44 percent. See Anthony P. Carnevale, Stephen J. Rose, and Andrew R. Hanson, *Certificates: Gateway to Gainful Employment and College Degrees*, Georgetown Center on Education and the Workforce, 2012, https://cew.georgetown.edu/cew-reports/certificates/.

15. See Carnevale, Rose, and Hanson, *Certificates*, Figure 2.

16. Carnevale, Rose, and Hanson, *Certificates*; and US Department of Education, "Certificates Below the Associate's Degree Level Conferred by Postsecondary Institutions, by Race/Ethnicity and Sex of Study: 1998–99 Through 2015–16," August 2017, https://nces.ed.gov/programs/digest/d17/tables/dt17_320.20.asp.

17. US Department of Education, "Certificates Below the Associate's Degree Level Conferred by Postsecondary Institutions, by Race/Ethnicity and Sex of Study: 1998–99 Through 2015–16," https://nces.ed.gov/programs/digest/d17/tables/dt17_320.20.asp; US Department of Education, "Associate's Degree Conferred by Postsecondary Institutions, by Race/Ethnicity and Sex of Student: Selected Years, 1976–77 Through 2015–16," August 2017, https://nces.ed.gov/programs/digest/d17/tables/dt17_321.10.asp; and US Department of Education, "Bachelor's Degree Conferred by Postsecondary Institutions, by Race/Ethnicity and Sex of Student: Selected Years, 1976–77 Through 2015–16," August 2017, https://nces.ed.gov/programs/digest/d17/tables/dt17_322.10.asp.

18. Elka Torpey, "Certificates: A Fast Track to Careers," *Occupational Outlook Quarterly* (Winter 2012–13), www.bls.gov/careeroutlook/2012/winter/art01.pdf.

19. Carnevale, Rose, and Hanson, *Certificates*; and Torpey, "Certificates: A Fast Track to Careers."

20. See Mina Dadgar and Madeline Joy Trimble, "Labor Market Returns to Sub-Baccalaureate Credentials: How Much Does a Community College Degree or Certificate Pay?," *Educational Evaluation and Policy Analysis* 37, no. 4 (November 2014): 399–418, http://journals.sagepub.com/doi/abs/10.3102/0162373714553814; and Stephanie Riegg Cellini and Nicholas Turner, "Gainfully Employed? Assessing the Employment and Earnings of For-Profit College Students Using Administrative Data," *Journal of Human Resources* 54, no. 2 (2018), http://jhr.uwpress.org/content/early/2018/01/31/jhr.54.2.1016.8302R1.full.pdf+html.

21. US Department of Education, National Center for Education Statistics, "Working Definitions of Non-Degree Credentials," https://nces.ed.gov/surveys/gemena/definitions.asp.

22. The US Census Bureau notes that "about two-thirds of adults who held a professional certification or license had to take periodic tests or continuing education credits in order to maintain it." Ewert and Kominski, "Measuring Alternative Educational Credentials."

23. US Department of Labor, Bureau of Labor Statistics, "Certification and Licensing Status of Employed Persons 16 Years and over by Selected Characteristics, 2017 Annual Averages," https://www.bls.gov/cps/cpsaat51.pdf.

24. Elka Torpey, "Will I Need a License or Certification for My Job?," US Department of Labor, Bureau of Labor Statistics, September 2016, https://www.bls.gov/careeroutlook/2016/article/will-i-need-a-license-or-certification.htm.

25. CareerOneStop, "Certification Finder," https://www.careeronestop.org/Toolkit/Training/find-certifications.aspx.

26. As quoted in the report, "in Burning Glass' sample of 16 million postings from 2015 in unlicensed fields, more than 1.4 million asked for at least one certification. Nearly 2,500 distinct certifications were named in postings. Yet the demand for certifications is centered on a small number of credentials. The vast majority are rarely requested in job postings. Out of a total of more than 2 million certification requests in 2015, two-thirds ask for one of the top 50 certifications, and the top 100 represent a staggering 75% of total demand. Stated another way, only 4% of employer-requested certifications account for 75% of demand." See Will Markow et al., *The Narrow Ladder: The Value of Industry Certifications in the Job Market*, Burning Glass Technologies, October 2017, www.burning-glass.com/wp-content/uploads/BurningGlass_certifications_2017.pdf.

27. See also US Department of Labor, Bureau of Labor Statistics, "Median Weekly Earnings of Full-Time Wage and Salary Workers by Certification and Licensing Status and Selected Characteristics, 2017 Annual Averages," 2018, www.bls.gov/cps/cpsaat54.pdf.

28. US Department of Education, National Center for Education Statistics, "Working Definitions of Non-Degree Credentials."

29. BLS notes that adults with licenses may also have industry certifications. See US Department of Labor, Bureau of Labor Statistics, "Certification and Licensing Status of Employed Persons 16 Years and over by Selected Characteristics, 2017 Annual Averages."

30. Torpey, "Will I Need a License or Certification for My Job?"

31. For two comprehensive accounts of the literature on occupational licensure, see White House Council of Economic Advisers, *Occupational Licensing: A Framework for Policymakers*, July 2015, https://obamawhitehouse.archives.gov/sites/default/files/docs/licensing_report_final_nonembargo.pdf; and Ryan Nunn, *Occupational Licensing and American Workers*, Hamilton Project, June 21, 2016, www.hamiltonproject.org/papers/occupational_licensing_and_the_american_worker.

32. US Department of Education, "Role of Formal Education in Work Experience Programs," May 2018, https://nces.ed.gov/datapoints/2018058.asp.

33. See US Department of Education, "Adult Training and Education Survey Codebook," February 2018, #46, https://nces.ed.gov/nhes/data/2016/cbook_ates_pu.pdf.

34. US Department of Education, "Table A69. Among Adults Ages 25 to 64 Who Completed a Work Experience Program, Percentage Distribution Across Program Occupational Fields, by Highest Level of Education: 2016," 2018, https://nces.ed.gov/surveys/ctes/tables/A69.asp.

35. Formal training is defined in the BLS 1995 Survey of Employer-Provided Training as "training that is planned in advance and that has a structured format and a defined curriculum." See Harley Frazis et al., "Results from the 1995 Survey of Employer-Provided Training," US Department of Labor, Bureau of Labor Statistics, June 1998, www.bls.gov/opub/mlr/1998/06/art1full.pdf; and Robert I. Lerman, Signe-Mary McKernan, and Stephanie Riegg, "The Scope of Employer-Provided Training in the United States: Who, What, Where, and How Much?," Upjohn Institute, 2004, 216–18, https://research.upjohn.org/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1175&context=up_bookchapters. In a more recent report, "Formal learning or training features a scheduled, regimented series of learning or training sessions, typically administered by an assigned trainer." See Anthony P. Carnevale, Jeff Strohl, and Artem Gulish, *College Is Just the Beginning: Employers' Role in the $1.1 Trillion Postsecondary Education and Training System*, Georgetown University, Center on Education and the Workforce, 2015, https://files.eric.ed.gov/fulltext/ED558166.pdf. See also the BLS definitions for long-term, moderate-term, and short-term on-the-job training. US Department of Labor, Bureau of Labor Statistics, "Measures of Education and Training," www.bls.gov/emp/documentation/education/tech.htm; and US Department of Labor, Bureau of Labor Statistics, "BLS Education and Training Definitions," https://laborstats.az.gov/sites/default/files/documents/files/trm-04-2010to2020-notes02.pdf.

36. Formal on-the-job training is considered one of the most effective types of job training because of employers' influence over instruction and the immersive context in which training occurs. See What Works Centre for Local Economic Growth, *Evidence Review: Employment Training*, June 2016, www.whatworksgrowth.org/public/files/Policy_Reviews/16-06-15_Employment_

Training_Update.pdf. One 2005 study by BLS economists finds that participating in 60 hours of formal on-the-job training can increase wages by 3 percent on average. See Harley Frazis and Mark A. Loewenstein, "Reexamining the Returns to Training: Functional Form, Magnitude and Interpretation," *Journal of Human Resources* 40, no. 2 (Spring 2005): 453–76, https://www.jstor.org/stable/4129533. Prior analyses of formal on-the-job training have found that it tends to be targeted more toward middle- and upper-level employees and those with higher levels of education rather than entry-level or less-educated employees. Lerman, McKernan, and Riegg, "The Scope of Employer-Provided Training in the United States." The study also finds that larger firms are more likely to provide formal on-the-job training than are smaller firms. A recent Georgetown Center on Education and the Workforce report finds that employers spend the majority of their formal training dollars on college-educated workers, with bachelor's degree holders accounting for 58 percent of annual spending. Carnevale, Strohl, and Gulish, *College Is Just the Beginning*.

37. US Department of Labor, Employment and Training Administration, "What Is Registered Apprenticeship?," www.doleta.gov/oa/faqs.cfm.

38. Apprenticeships here are broadly defined to include both the Department of Labor's formal "registered apprenticeship" program and informal "unregistered" apprenticeship programs, which are outside the purview of the federal government.

39. US Department of Labor, Employment and Training Administration, "Registered Apprenticeship National Results: Fiscal Year (FY) 2017 (10/01/2016 to 9/30/2017)," https://doleta.gov/oa/data_statistics.cfm; and Robert I. Lerman, *Training Tomorrow's Workforce: Community College and Apprenticeship as Collaborative Routes to Rewarding Careers*, Center for American Progress, December 2009, 9, www.urban.org/sites/default/files/publication/27996/1001360-Training-Tomorrow-s-Workforce.PDF.

40. Debbie Reed et al., *An Effectiveness Assessment and Cost-Benefit Analysis of Registered Apprenticeship in 10 States*, Mathematica Policy Research, July 25, 2012, https://wdr.doleta.gov/research/FullText_Documents/ETAOP_2012_10.pdf.

41. US Department of Labor, "Data and Statistics: Registered Apprenticeship National Results."

42. See Lauren Camera, "Apprenticeship Efforts Still Hampered by Stereotypes," *US News & World Report*, February 9, 2016, https://www.usnews.com/news/articles/2016-02-09/apprenticeship-efforts-still-hampered-by-stereotypes; Catherine Gewertz, "Trump Makes a Big Push for High School Apprenticeships," *Education Week*, June 14, 2017, http://blogs.edweek.org/edweek/high_school_and_beyond/2017/06/trump_makes_big_push_for_high_school_apprenticeships.html; and Scott Carlson, "Everyone Agrees on Value of Apprenticeships. The Question Is How to Pay for Them.," *Chronicle of Higher Education*, December 1, 2017, https://www.chronicle.com/article/Everyone-Agrees-on-Value-of/241961.

43. Enrolled college students are included in the sample frame. The ATES:16 surveyed a nationally representative address-based sample covering the 50 states and the District of Columbia and was conducted by the US Census Bureau from January through August 2016. When weighted, the ATES data are nationally representative of noninstitutionalized adults age 16–65, not enrolled in grade 12 or below. The total number of completed ATES questionnaires was 47,744, representing a population of 196.3 million. See US Department of Education, *Adult Training and Education: Results from the National Household Education Surveys Program of 2016*, February 2018, https://nces.ed.gov/pubs2017/2017103rev.pdf.

44. American Institutes for Research, "Adult Training and Education Survey (ATES)," https://www.air.org/project/adult-training-and-education-survey-ates.

45. US Department of Education, "Certification and Licensure Questions Included in Federal Surveys," May 2016, https://nces.ed.gov/surveys/gemena/surveys.asp.

46. The Opportunity America–AEI–Brookings Institution Working Class Study Group defines the working class as adults age 25–64 with (1) educational attainment of a high school diploma or equivalent, some college, or an associate degree, but no bachelor's degree, and (2) household income between the 20th and 50th percentile, adjusted for household size. The ATES survey, however, asks respondents only their individual earnings over the past 12 months. ("Which category best fits your earnings from wages, salary, commissions, bonuses, or tips, from all jobs over the past 12 months? Report amount before deductions for taxes, bonds, dues, or other items.") The survey then reports that figure as a categorical variable in increments of $10,000 (e.g., $0–$10,000, $10,000–$20,000, and so forth). Just under 80 percent of the ATES sample of adults reported individual income. I omitted those who did not report individual income when developing the working-class and lower- and upper-income categories. Therefore, results for those categories are biased in favor of those with individual incomes to report (i.e., labor force participants). Furthermore, I selected the range $20,000–$40,000 to represent the working class. That individual income range corresponds roughly to the 25th–80th percentile of the distribution of individual income for the working-class group as determined by Ron Haskins and Nathan Joo in a complementary analysis for the working group using the Current Population Survey. As such, the income range for the working class used in this analysis ($20,000–$40,000) represents a more restrictive estimate of the working class with respect to individual income.

47. I constrain the lower- and upper-income comparison groups to educational attainment levels of a high school diploma or equivalent, some college, or an associate degree to facilitate a credible comparison between groups, as higher levels of traditional education attainment are associated with nondegree credential attainment.

48. Postsecondary certificates are sub-baccalaureate certificates in this analysis. The ATES also captures information on post-baccalaureate certificates, typically conferred in graduate or professional education settings, but these are dropped from the analysis.

In addition, the ATES first-look report constrains their measurement of sub-baccalaurete certificates by program length and other restrictions, while this report does not. See US Department of Education, *Adult Training and Education: Results from the National Household Education Surveys Program of 2016*.

49. There are four relevant variables in the ATES: CTLEVEL means the respondent earned a certificate from a college, technical, or other school. CNMAIN means the respondent currently has a professional certification or state/industry license. WEPROG means the respondent has completed an internship, co-op, practicum, clerkship, externship, residency, clinical experience, apprenticeship, or similar program. APPRENT indicates where the respondent completed a "classic" apprenticeship program (with training wage, on-the-job instruction, and classroom instruction). Certifications and licenses are mutually exclusive because they are determined by the same two questions: "Do you have a currently active professional certification or a state or industry license?" and "Is your most important certification or license required by a federal, state, or local government agency in order to do that kind of work?"

50. In this analysis, I considered only respondents' "most important" certifications and licenses, though the ATES captures information for up to three. Industry certifications and licenses are thus mutually exclusive in this analysis, though, if including all certifications and licenses held by individuals, it is possible for respondents to hold both a certification and license. I also only considered certifications and licenses reported as "valid." In the ATES, a certification or license "received an invalid flag if the respondent reported in the credential name or subject write-in fields that he or she did not have a credential or reported a foreign credential, an ID or work card, a personal or business credential, an educational credential, or a company certificate or designation." See US Department of Education, *National Household Education Surveys Program of 2016: Data File User's Manual*, February 2018, 197, Appendix J, https://nces.ed.gov/pubs2018/2018100.pdf.

51. Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

52. See US Department of Education, National Household Education Surveys Program of 2016, Appendix J; and US Department of Education, *Adult Training and Education: Results from the National Household Education Surveys Program of 2016*, 17.

53. Work-experience programs are not displayed in this section due to incongruences with the coding of work-experience programs versus that of the nondegree credentials. See WEFOLP, PSFOS, and CNFIELDCAT1 in US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016, https://nces.ed.gov/nhes/data/2016/ cbook_ates_pu.pdf. However, for working-class work-experience completers, the most common types of work were nursing (28 percent) and other health care (14 percent). Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

54. For certifications and licenses, the ATES coded both credentials with the same variables. Categories of field of study were coded with CNFIELDCAT1 (categories of field of most important certification or license), and subcategories were coded with CNFIELD1 (field of most important certification or license). The categories and subcategories for certifications/licenses are: (1) STEM: architecture, engineering, computers and information technology, and other science and mathematics (e.g., geologist, chemist, and microbiologist); (2) Business and finance: accounting, other business (e.g., management, administration, operations, human resources, and support), finance or insurance, and real estate; (3) Health care: basic life support, health care practitioner or provider (other than nursing), nursing, and other health care (e.g., paramedics, advanced life support, nursing specialties, physician specialties, technicians, assistants or aides, and medical therapy); (4) Personal care: cosmetology, childcare, and other personal care (e.g., mortician, chef, bartender, health coach, and dog groomer); (5) Public and social services: law or legal support, public safety, social work or counseling, other public or social services (e.g., notary, religion, librarian), and environmental, water, and food safety; (6) Teaching and instruction: K–12 teaching and other instruction or teaching (e.g., adult education and skills instruction outside the K–12 environment); (7) Trades: construction, vehicle maintenance/installation/repair, transportation or materials moving, and other trades (e.g., HVAC, building maintenance, and production); and (8) Other fields (e.g., urban planner, surveyor, scuba diving, horticulture, graphic designer, and sign language). For a full description of all categories and subcategories for the occupational fields for certifications and licenses, see US Department of Education, National Household Education Surveys Program of 2016, Appendix J.

55. Early ATES development work indicated that respondents cannot reliably differentiate between these two credentials. As a result, the ATES asks about both types of credentials in the same survey question ("Do you have a currently active professional certification or a state or industry license?") and then asks a separate question of whether it was required by government ("Is your most important certification or license required by a federal, state, or local government agency in order to do that kind of work?") to determine the distinction. Also, sometimes attaining an industry certification is part of a professional licensure process. In this sense, certifications and licenses are substantively similar. See US Department of Education, National Household Education Surveys Program of 2016. Prior research combines these categories as well. See Ewert and Kominski, "Measuring Alternative Educational Credentials."

56. The differences are statistically significant at the 0.05 level. All other differences in proportions mentioned in this section from this point forward are also statistically significant at the 0.05 level, unless otherwise noted.

57. All the subcategories are listed in US Department of Education, National Household Education Surveys Program of 2016, Appendix J.

58. Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

59. Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

60. Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016. For a full description of all categories and subcategories for the occupational fields for certifications and licenses, see US Department of Education, National Household Education Surveys Program of 2016, Appendix J.

61. For postsecondary certificates, the ATES only classified the certificates into subcategories with the variable PSFOS. I derived my own categories for certificates based on the categories for certifications/licenses (CNFIELDCAT1). The categories and subcategories for certificates are: (1) STEM: computer science or information technology and engineering technologies or drafting; (2) Business and finance: accounting, finance, insurance, real estate, administrative support, and business management or administration; (3) Health care; (4) Personal care: cosmetology, culinary arts, and funeral service or mortuary science; (5) Public and social services: law enforcement, security, firefighting, and law or legal studies; (6) Teaching and instruction: education; (7) Trades: agriculture, audio, broadcasting, multimedia, graphic design, construction trades, manufacturing or production, mechanic or repair technologies, and transportation; and (8) Other fields: liberal arts and other.

62. Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

63. See Webber, "Are College Costs Worth It?"; Mark Schneider, *Majors Matter: Differences in Wages over Time in Texas*, College Measures, July 20, 2016, www.air.org/resource/majors-matter-differences-wages-over-time-texas; Anthony P. Carnevale, Jeff Strohl, and Michelle Melton, *What's It Worth? The Economic Value of College Majors*, Georgetown University Center on Education and the Workforce, November 2014, https://cew.georgetown.edu/wp-content/uploads/2014/11/whatsitworth-complete.pdf; Clive Belfield and Thomas Bailey, "Does It Pay to Complete Community College—and How Much?," Center for Analysis of Postsecondary Education and Employment, March 2017, http://capseecenter.org/wp-content/uploads/2017/03/capsee-does-it-pay-complete-community-college.pdf; and Columbia University, Teachers College, Community College Research Center, "Labor Market Returns for Community College Credentials," http://ccrc.tc.columbia.edu/Labor-Market-Returns-for-Community-College-Credentials.html.

64. Douglas A. Webber, "Projected Lifetime Earnings for Bachelor's Degree Holders by Major," April 22, 2018, www.doug-webber.com/expected_bachelors.pdf.

65. The ATES did not ask certification and license holders about increasing their pay, and it did not ask certificate or work-experience program completers about staying marketable.

66. These estimates match with that of other estimates. See US Department of Education, "Percentage of the Population 25 to 64 Years Old Who Attained a Postsecondary Degree, by Highest Degree Attained, Age Group, and Country: 2016," October 2017, https://nces.ed.gov/programs/digest/d17/tables/dt17_603.30.asp.

67. Ewert and Kominski, "Measuring Alternative Educational Credentials."

68. The differences are statistically significant at the 0.05 level. All other differences mentioned in this section are also statistically significant at the 0.05 level.

69. Prior research has found this association as well. See US Department of Education, "The Relationship Between Education and Work Credentials," June 2015, https://nces.ed.gov/pubs2015/2015556.pdf; and US Department of Education, "Recent Participation in Formal Learning Among Working-Age Adults with Different Levels of Education," January 2008, https://nces.ed.gov/pubs2008/2008041.pdf.

70. Surprisingly, participation rates in apprenticeship seem to increase with educational attainment: 7 percent of advanced degree holders and 4 percent of bachelor's degree holders have completed an apprenticeship, above the average for all adults and the lesser-educated groups. Apprenticeships are measured slightly differently in the ATES, as a work-experience program in which participants received a training wage and participated in both formal in-class and on-the-job instruction—the essential components of a classic apprenticeship program. According to the ATES, the APPRENT variable indicates whether the person completed a "classic" apprenticeship program (with training wage, on-the-job instruction, and classroom instruction). It is derived from the ATES variables WEFOLP (type of last work-experience program), WEWAGE (What wage did you earn as part of your last work experience program?), WEPRP_INSTR (As part of your last work-experience program, did you have an instruction from a coworker or supervisor?), WEPRP_COLLG (As part of your last work-experience program, did you take classes from a college or trade or technical school?), and WEPRP_TRAIN (As part of your last work-experience program, did you take classes or training from a company, association, union, or private instructor?). See US Department of Education, National Household Education Surveys Program of 2016, 194. The estimates of apprenticeships in this report conflict with prior estimates of the prevalence of apprenticeship and its relation to educational attainment. See Cronen and Murphy, *Participation in Noncredit Occupational Education and Training*, which states, "Among the

1 percent of respondents who reported participating in an apprenticeship on the NHES Adult Education Survey of 2004–05, only 16 percent reported holding a bachelor's degree or higher, and approximately half reported holding a high school diploma or below." See also US Department of Education, "Recent Participation in Formal Learning Among Working-Age Adults with Different Levels of Education." This report examined the 2004–05 Adult Education Survey and found that 1.5 percent of all adults age 16–64 participated in an apprenticeship program and that "no consistent pattern was found for participation in apprenticeship programs by education level." Looking at two separate survey questions from the ATES related to apprenticeship—whether a respondent has official journeyman status or a federal apprenticeship number—1.6 percent of adults have the former, and 0.8 percent the latter. For adults age 25–64 who report having a federal apprenticeship number, roughly 31 percent report having a bachelor's degree or higher. For adults age 25–64 who report having journeyman status, roughly 20 percent report having a bachelor's degree or higher. These estimates more closely match the prior estimates of the prevalence of apprenticeships and their relation to educational attainment. Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016. No matter the estimate, apprenticeships are still not a common mode of occupational training.

71. Ewert and Kominski, "Measuring Alternative Educational Credentials."

72. US Department of Labor, Bureau of Labor Statistics, "Media Weekly Earnings of Full-Time Wage and Salary Workers by Certification and Licensing Status and Selected Characteristics, 2017 Annual Averages," https://www.bls.gov/cps/cpsaat54.pdf. Neither report accounts for differing characteristics of adults with nondegree credentials versus those without credentials.

73. Lul Tesfai, Kim Dancy, and Mary Alice McCarthy, "Paying More and Getting Less: How Nondegree Credentials Reflect Labor Market Inequality Between Men and Women," New America, September 13, 2018, https://www.newamerica.org/education-policy/reports/paying-more-and-getting-less/paying-more-and-getting-less.

74. Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

75. Author's calculations using US Department of Education, National Center for Education Statistics, Adult Training and Education Survey of the National Household Education Surveys Program, 2016.

76. See Schneider and Columbus, *Degrees of Opportunity*; and Carnevale, Strohl, and Melton, *What's It Worth?*

77. Carnevale, Rose, and Hanson, *Certificates*.

78. Tesfai, Dancy, and McCarthy, "Paying More and Getting Less."

79. See Ewert and Kominksi, "Measuring Alternative Educational Credentials"; US Department of Labor, Bureau of Labor Statistics, "Median Weekly Earnings of Full-Time Wage and Salary Workers by Certification and Licensing Status and Selected Characteristics, 2017 Annual Wages"; and Maury Gittleman, Mark A. Klee, and Morris M. Kleiner, "Analyzing the Labor Market Outcomes of Occupational Licensing" (working paper, US Department of Commerce, US Census Bureau, September 2014), www.census.gov/content/dam/Census/library/working-papers/2014/demo/SIPP-WP-270.pdf.

80. See Michael Prebil and Mary Alice McCarthy, *Building Better Degrees Using Industry Certifications: Lessons from the Field*, New America, September 17, 2018, https://s3.amazonaws.com/newamericadotorg/documents/Building_Better_Degrees_Using_Industry_Certifications_2018-09-17_130631.pdf; Lumina Foundation, *Report on Phase I Study: Embedding Industry and Professional Certifications Within Higher Education*, January 2017, www.luminafoundation.org/files/resources/report-on-phase-i-study-embedding-industry-professional-certifications-within-higher-education-january-2017.pdf; and Callie Murray, "The Role of Community Colleges in Registered Apprenticeship," August 2018, https://apprenticeshipusa.workforcegps.org/resources/2017/04/10/11/14/The-Role-of-Community-Colleges-in-Registered-Apprenticeship.

81. See Ryan Craig, *A New U: Faster + Cheaper Alternatives to College* (Dallas, TX: BenBella Books, 2018); and Brown and Kurzweil, *The Complex Universe of Alternative Credentials and Pathways*, 28–32.

82. For examples, see Tamar Jacoby, "Employer Engagement in Career Education," testimony before Subcommittee on Higher Education and Workforce Development, House Committee on Education and the Workforce, US House of Representatives, May 9, 2018, http://opportunityamericaonline.org/wp-content/uploads/2018/05/OA-EW-testimony-5-18.pdf.

83. For instance, see Taylor Maag, "What States Can Learn from Virginia's FastForward into the Future of Work," Jobs for the Future, June 18, 2018, https://www.jff.org/points-of-view/what-states-can-learn-virginias-fastforward-future-work/.