



What the Adult Training and Education Survey Tells Us About the Skilled Technical Workforce

Vicki Lancaster, Ph.D.
Principal Scientist
val7zv@virginia.edu

University of Virginia
Biocomplexity Institute and Initiative
Social and Decision Analytics Division
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Introduction

As defined by Rockwell (2016), a job in the skilled technical workforce (STW) is one that is open to an individual without a bachelor's degree who has a high level of knowledge in a technical domain such as computers, mathematics, healthcare, architecture, engineering, construction, or extraction. The United States needs a STW to foster innovation and remain competitive in the global economy, but findings by the National Academies' in *Building America's Skilled Technical Workforce* (2017) indicate the United States is not adequately developing and sustaining the STW needed to compete in the 21st century; they project that by 2022 the United States will have 3.4 million unfilled STW jobs. Our understanding of this shortfall is in part due to data deficits that prohibit our ability to describe and quantify the skill formation pathways that lead to employment in the STW. These data deficits hinder the ability of policy makers to develop workforce programs, the ability of educators to develop relevant training programs, and the ability of job seekers to make informed decisions regarding the nondegree credentials that will lead to employment in the STW.

There are federal surveys that provide information on post-secondary academic degrees that lead to employment in science, technology, engineering, and mathematics (STEM) fields¹, but there are no equivalents that survey the landscape of postsecondary nondegree credentials that can lead to employment in the STW. A nationally representative demographic survey of work and education experience that draws the distinction between traditional and nontraditional forms of education is needed. These nontraditional forms of education do not confer credit toward a traditional academic degree but provide a credential of training and skills acquisition. Without a nationally representative demographic survey of work and education experience that draws a distinction between traditional and nontraditional forms of education, the use of education as an indicator of skill level can mask variation in skill levels within educational categories (Lemieux, 2006).

In September 2019, a report by the nonprofit Credential Engine, *Counting U.S. Secondary and Postsecondary Credentials*, counted at least 738,428 unique postsecondary credentials in the U.S. Their report identified 17

¹Survey of Earned Doctorates <https://nsf.gov/statistics/srvydoctorates/>; Survey of Graduate Students & Postdoctorates in Science and Engineering <https://www.nsf.gov/statistics/srvygradpostdoc/> Accessed on December 15, 2019

credential categories that fall into four types of education: post-secondary educational institutions, massive open online course providers, non-academic organizations, and secondary schools. Specific findings include:

- 370,020 credentials issued by postsecondary educational institutions, including both those that participate in Title IV and those that do not;
- 7,132 credentials from MOOC providers, the vast majority of them being course completion certificates;
- 315,067 credentials from non-academic organizations, with the largest categories being digital badges and online course completion certificates; and
- 46,209 credentials from public and private secondary schools.

An effort to address the current data deficit began in 2009 with the Interagency Working Group on Expanded Measures of Enrollment and Attainment (GEMEnA)². GEMEnA developed a core set of survey items on post-secondary nondegree credentials, that include work experience programs, certifications, licenses, and certificates, with the intent of deploying them within the federal statistical system. The National Center for Education Statistics (NCES) fielded these questions in 2016 in their Adult Training and Education Survey (ATES).

This paper looks at those ATES respondents whose education level is less than a Bachelor's degree, have a post-secondary nondegree credential, and are using it in their current job (sample size = 6,960). Comparisons are made by further categorizing this subpopulation by their education level, high school or less, some college but no degree, and Associate's degree, and the job type, in the STW or not in the STW. Finally the results from the ATES are linked to two other surveys on post-secondary non-degree credentials one conducted by the Strada Education Network and the other by Christensen et al. (2013) at the University of Pennsylvania.

About the ATES

The ATES was administered to noninstitutionalized U.S. adults ages 16 to 65 not enrolled in high school (N=47,744) as part of the 2016 National Household Education Surveys (NHES: 2016). Besides survey items on post-secondary nondegree credentials, survey items also included characteristics of the respondents including sex, race/ethnicity, age, level of education, labor force and employment status, earnings, job sector, and occupational field.

From 2009 to 2017, the Interagency Working Group on Expanded Measures of Enrollment and Attainment (GEMEnA) worked to develop and validate national measures of the participation in and credentialing of education and training for work, and to build government-wide consensus for the adoption of these measures in key federal

²Interagency Working Group on Expanded Measures of Enrollment and Attainment <https://nces.ed.gov/surveys/gemena/>. Accessed on December 15, 2019

data collections. More specifically, GEMEnA engaged in a rigorous process of survey item development to validate core items on 1) the attainment of nondegree credentials, including industry-recognized certifications, occupational licenses, and educational certificates; and 2) enrollment in education and training that prepares people for work.

One of the goals of the ATES was to capture the prevalence of certifications, licenses, and certificates. Their definitions are from the National Center for Education Statistics (<https://nces.ed.gov/surveys/gemena/definitions.asp>).

1. Certification: A credential awarded by a certification body based on an individual demonstrating through an examination process that he or she has acquired the designated knowledge, skills, and abilities to perform a specific job. The examination can be either written, oral, or performance-based. Certification is a time-limited credential that is renewed through a recertification process.
2. License: A credential awarded by a government agency that constitutes legal authority to do a specific job. Licenses are based on some combination of degree or certificate attainment, certifications, assessments, or work experience; are time-limited; and must be renewed periodically.
3. Educational certificate: A credential awarded by an educational institution based on completion of all requirements for a program of study, including coursework and test or other performance evaluations. Certificates are typically awarded for life (like a degree). Certificates of attendance or participation in a short-term training (e.g., 1 day) are not in the definitional scope for educational certificates.

A second goal was to learn more about work experience programs, including characteristics of the programs that adults participated in and the programs' perceived usefulness in the labor market. While these programs do not necessarily result in work or educational credentials, they are one way for adults to develop work skills.

Methodology

The analysis was conducted using the public-use data file of the 2016 survey, made available through the National Center for Education Statistics. The analysis is descriptive and does not attempt to establish causation, instead it illustrates how post-secondary nondegree credentials are related to various outcomes of interest. In order to analyze the ATES from the STW perspective two derived variables were created, a variable for the STW education categories (high school or less, some college, and Associate's degree) and a variable to identify STW occupations (STW and nonSTW). All 47,744 responders replied to the question regarding their "highest degree or level of school". There was a total of ten answers to the question, six of which were less than a Bachelor's degree (Table 1); these were grouped into the three STW education categories. Of the 47,744 responders, 29,223 (61.21%) of the adults had less than a Bachelor's degree and 18,521 (41.39%) had either a Bachelor's, Master's, Doctorate, or Professional degree.

Table 1. What is the highest degree or level of school you have completed? (Q1)*

STW Education Category	ATES Item Response (Q1)	Frequency	Percent
High School (HS) Degree or Less (13,879 / 29.06%)	No HS diploma or GED	3,067	6.42
	HS Diploma	9,072	19.00
	GED or Alternative HS Credential	1,740	3.64
Some College (10,860 / 22.75%)	< 1-year College Credit	3,777	7.91
	≥1-year College Credit	7,083	14.84
Associate's Degree	Associate's Degree	4,484	9.39
	<i>STW Education Total</i>	29,223	61.21
nonSTW Education Category	ATES Item Response (Q1)	Frequency	Percent
Bachelor's Degree (BA, BS)	Bachelor's Degree (BA, BS)	11,313	23.69
Master's Degree	Master's Degree	5,104	10.69
Professional Degree beyond (BA, BS)	Professional Degree beyond (BA, BS)	1,259	2.64
Doctorate Degree	Doctorate Degree	845	1.77
	<i>nonSTW Education Total</i>	18,521	38.79

*There were no missing values or valid skips.

The second derived variable assigned the current job to a job type, defined as either in the STW or not in the STW. Based on the response to the question regarding the occupation of their current job, American Community Survey (ACS) occupation codes³ were assigned and used to categorize a job as in the STW or not in the STW. Of the 29,223 potential skilled technical workers (adults with less than a Bachelor's degree), 25,431 (87.02%) responded to the question "What kind of work were you doing?" (Q66)⁴ that could be classified into an ACS occupation code; there were 1,354 (4.63%) valid skips and 2,438 (8.34%) unclassified occupations (Table 2). The ACS occupation codes were further classified by (find out from John who created the tables) into job type and are provided in the Appendix.

Table 2. Job Type (STW versus nonSTW) by STW Education Category

STW Education Category	Job Type	Frequency	Percent*
High School (HS) Degree or Less (13,879 / 29.06%)	STW	2,762	19.90
	nonSTW	9,355	67.40
	NA*	1,762	12.70
Some College (10,860 / 22.75%)	STW	2,134	19.65
	nonSTW	7,288	67.11
	NA	1,438	13.24
Associate's Degree (4,484 / 9.39%)	STW	875	19.51
	nonSTW	3,017	67.28
	NA	592	13.20

*Percent adds to 100 within each STW Education Category.

**NA = valid skips and unclassified occupations

³A full list of American Community Survey (ACS) occupation codes is provided in the 2015 ACS code list, which is available from the Census.gov website at https://www2.census.gov/programs-surveys/acs/tech_docs/code_lists/2015_ACS_Code_Lists.pdf. Accessed on December 27, 2019.

⁴This was an open-ended question.

The analytical sample for this report is ATEs respondents whose education level is less than a Bachelor's degree, have a certification/license, certificate, or participated in a work experience program, and are using it in their current job (sample size = 6,960).

Demographics

The summary statistics displayed in Table 3 are aggregated by the post-secondary nondegree credential and within that the job type for a total of six combinations. 318 (4.6%) of the jobs could not be assigned an occupation code and therefore a job type. Within each of these six categories the data are further aggregated by the demographic categories, gender, race, military status, and Hispanic origin. Historically minority groups and females are underrepresented in STEM so one of the goals in building the STW is that it reflects the diversity of the American population.

In all six categories the largest racial group is white, the percentages range from a low of 75.8 for respondents with a certificate in a nonSTW job (35% in office and administrative support) to a high of 82.6 for respondents who participated in a work experience program in a STW job where 50% of the jobs were in healthcare. The education trend is reversed for the second largest racial group, Black or African Americans, where the largest percentage, 13.6, is for respondents with a certificate in a nonSTW job where 35% of these jobs are in office and administrative support and the smallest percentages are 8.7 in a work experience program in a STW job (59% in healthcare) and certification/license in a nonSTW job (21% in personal care and service). For respondents of Hispanic, Latino, or Spanish origin, 64% of the certifications/licenses, 49% of the certificates, and 61% of the work experience programs are for STW jobs in healthcare. For veterans 24% of certifications/licenses are in installation, maintenance and repair and 23% in healthcare practitioners and technical, 38% of certificates are in installation, maintenance and repair; and 22% of work experience programs are in construction and extraction and 21% in healthcare practitioners and technical.

Table 3. Demographics for the ATEs Respondents Using Their Post-secondary Nondegree Credential or Work Experience Program for Their Current Job by Job Type (N = 6,960)

Post-secondary Education Category	Job Type	Gender (Q73)		Served on Active Duty* (Q71)		Hispanic Origin (Q79)		Race** (Q80)				
		Female	Male	Yes	No	Yes	No	AMIND	Asian	Black	PACI	White
Certifications & Licenses (3,466) (160 occupations cannot be classified)	STW (1,540 / 44%)	55%	45%	10%	90%	11%	89%	0.7%	3.2%	9.0%	3.2%	82.0%
	nonSTW (1,766 / 51%)	52%	48%	9%	91%	9%	91%	0.8%	2.1%	8.7%	0.1%	82.5%
Certificates (1,920) (92 occupations cannot be classified)	STW (739 / 38%)	39%	61%	11%	89%	11%	89%	0.8%	2.7%	8.8%	0.5%	81.7%
	nonSTW (1,089 / 57%)	58%	42%	9%	91%	9%	91%	1.2%	2.6%	13.6%	0.3%	75.8%
Work Exp. Programs (1,574) (66 occupations cannot be classified)	STW (820 / 52%)	50%	50%	10%	90%	9%	91%	1.2%	2.3%	8.7%	0.7%	82.6%
	nonSTW (688 / 44%)	54%	46%	9%	91%	11%	89%	0.9%	2.8%	11.2%	0.6%	78.0%

*Active duty in the U.S. Armed Forces, Reserves, or National Guard

**AMIND=American Indian or Alaska Native; PACE=Native Hawaiian or other Pacific Islander

A difference between the post-secondary nondegree credentials is the age of the employees (Figure 1). For both certifications/licenses and certificates the age distributions for both jobs types are left skewed, the mean is less the median; all four medians are between 52 and 54, the means are displayed in Figure 1 using a circle. For work experience programs the age distributions are more bi-modal with both medians at 50. The age distributions are similar for job type regardless of the post-secondary nondegree credential.

A question on the number of hours worked in the previous week, revealed that all workplace experience jobs were full-time. The breakdown between full- and part-time jobs for certifications/licenses and certificates is displayed in Figure 2, included is the number of respondents in a part-time job that would have preferred a full-time job (grey rectangles). The largest percentage of responders in part-time jobs that would prefer a full-time job are males with certificates in nonSTW jobs (41%) and males with certificates/licenses in STW jobs (36%). A question on the number of hours worked in the previous week, revealed that all workplace experience jobs were full-time. The breakdown between full- and part-time jobs for nondegree credentials is displayed in Figure 2, included is the number of respondents in a part-time job that would have preferred a full-time job (grey rectangles). The largest percentage of responders in part-time jobs that would prefer a full-time job are males with certificates in nonSTW jobs (41%) and males with certificates & licenses in STW jobs (36%).

Figure 1. Age Distributions for Post-secondary Nondegree Credentials and Work Experience Program by Job Type

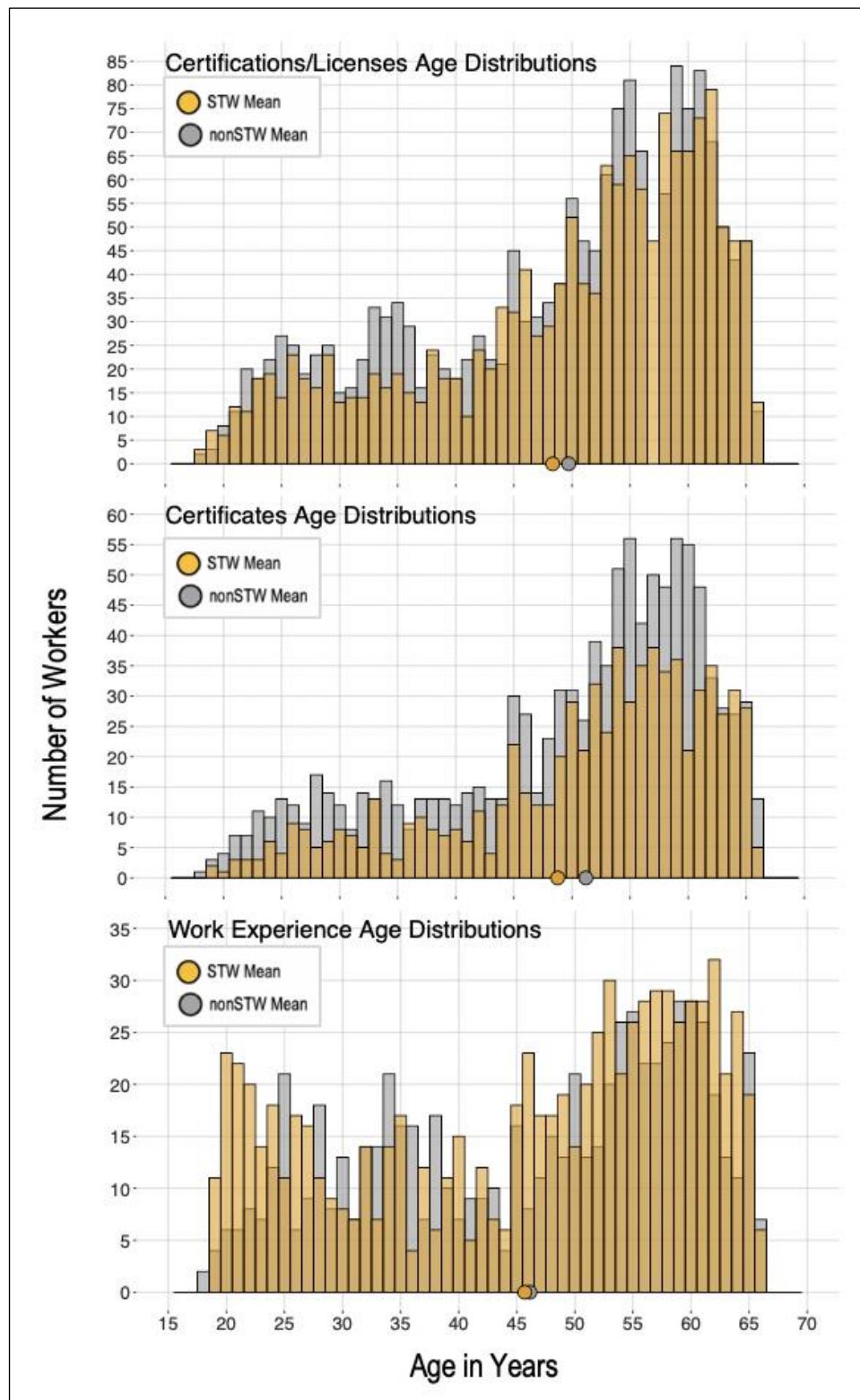
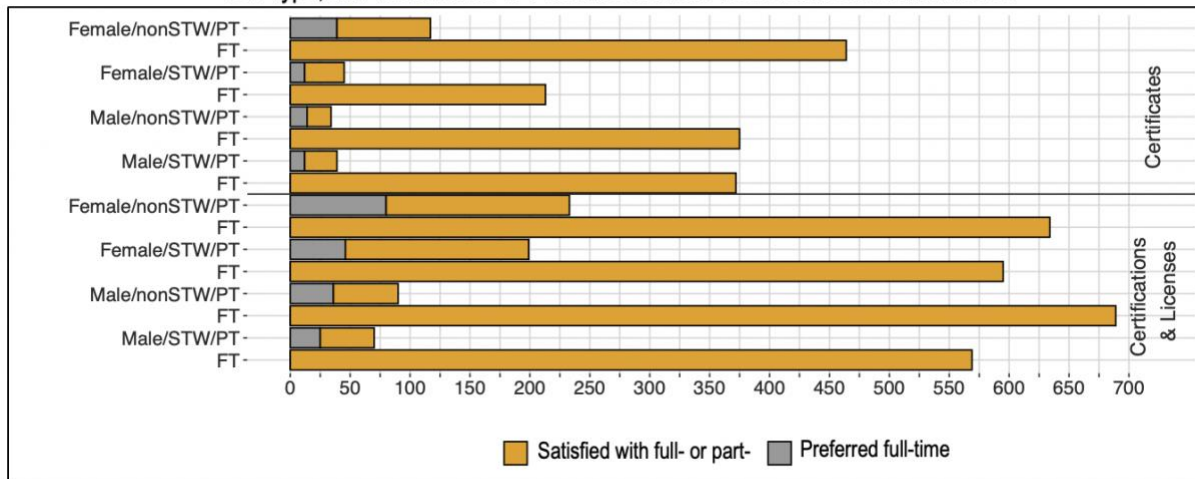


Figure 2. Number of Respondents in Full- and Part-time Jobs by Two Nondegree Credentials*, Gender, and Job Type; and the Number of Part-time Workers that Preferred a Full-time Job



FT=Full-time and PT=Part-time; STW=Skilled Technical Workforce job and nonSTW=Not a Skilled Technical Workforce job

*All workplace experience jobs were full-time.

In *Paying More and Getting Less How Nondegree Credentials Reflect Labor Market Inequality Between Men and Women* (Tesfai, Dancy, and McCarthy, 2018), the authors analyzed the ATES data to gain a better understanding of employment and earnings patterns among men and women with nondegree credentials and work experience programs (the analysis did not make the distinction between STW and nonSTW jobs). Their analytical sample consisted of adults below the bachelor's degree level. The different analytic samples reveal different gender employment patterns; Tesfai, Dancy, and McCarthy (2018) found that men were more likely to be employed than women across all three post-secondary education categories when all major occupation groups were combined.⁵ Our analysis shows this does not hold when taking into account whether or not the nondegree credential or work experience program was related to their current job. When this is taken into account the percentage of females is greater or equal to males for five of the six combinations (post-secondary nondegree credential (3) x job type (2)) with the exception of certificates for jobs in the STW. What is consistent across both analyses is the high levels of occupational segregation by gender. Similar to Tesfai, Dancy, and McCarthy (2018), males make up greater than 96 percent of the employees in construction, installation, and repair occupations and greater than 71 percent in computer and mathematics occupations regardless of whether the post-secondary nondegree credential is being used in the current job. Alternatively, women were overrepresented in healthcare by greater than 84 percent. The complete breakdown of major occupation group (MOG) by post-secondary nondegree credential by job type and gender is displayed in Table 4.

⁵Tesfai, Dancy, and McCarthy (2018) found that 74 percent of men with a post-secondary certificate were employed compared with 67 percent of women. This difference held for certifications/licenses and work experience programs although the difference was smaller (Figure 2, page 10).

Table 4. Major Occupation Group Counts by Post-secondary Nondegree Credential or Work Experience Program for Respondents Current Job by Job Type and Gender

Major Occupation Group	Certifications & Licenses				Certificates				Work Experience Programs			
	STW		nonSTW		STW		nonSTW		STW		nonSTW	
	F	M	F	M	F	M	F	M	F	M	F	M
Architecture & Engineering	4	30			9	40			9	30		
Art, Design, Entertainment, Sports		1	13	10	1	3	5	10		4	17	14
*Bldg. & Grounds/Cleaning & Maint.			7	37			9	27			4	16
Community & Social Services	2		14	7	5	1	8	2	6	2	9	4
Computer & Mathematics	12	49			15	39			10	20		
Construction & Extraction	2	170	1	46	3	75		28	3	133	2	32
Education, Training, & Library			80	15			37	9			34	5
Farming, Fishing, & Forestry			2	4				1				2
Food Preparation & Serving Related	5	5	40	20	2	3	23	17	3	6		
Healthcare Practitioners & Technical	537	88			129	19			235	54		
Healthcare Support	245	32			92	7			114	17	17	11
Installation, Maintenance, & Repair	4	187		18	4	150		16	2	63	1	15
Legal			14	3			16	1			4	1
Life, Physical, & Social Science	2	5			1	3			8	1		
Management	26	20	136	158	18	24	92	107	17	12	45	74
Material Moving			2	25			2	18			1	6
Military Specific	2	5				1				3		
Office & Administrative Support	1		152	49	3		279	42	1	123		9
Personal Care & Service			221	46			67	14			58	16
Production	5	57	9	40	4	69	13	44	3	48	11	29
Protective Service	1	33	21	80	1	16	15	34		14	8	17
Sales Related			160	122			53	43			32	27
Transportation		10	44	169		2	12	45			6	8

yellow filled cells # females > # males in STW Major Occupation Group

*Building & Grounds/Cleaning & Maintenance

Preparation for Nondegree Credential or Work Experience Program

For each of the post-secondary nondegree credential there were a series of questions on the preparation process. A summary of the responses is in Table 5. The numbers in the cells are percentages which sum to 100% for each post-secondary nondegree credential by education level combination.

The responses are consistent across post-secondary nondegree credential. The preparation route with the largest percentage for a certification/license is non-college and self-study for all STW education categories; the location changes to a college/university when preparing for a certificate but the percentages across the STW education categories are similar. The biggest difference between education categories is in the preparation for work experience programs, those with a high school education or less and some college prefer on the job training and those with an associate's degree rely on a combination of on the job training and college classes to prepare.

Table 5. How Did You Prepare for the Post-secondary Nondegree Credential or Work Experience Program?

	High School Degree or Less STW / nonSTW	Some College STW / nonSTW	Associate's Degree STW / nonSTW
Preparation for Certification/License (Q13)			
College Classes	14.22	13.62	6.80
Non-College Classes	6.85	9.77	14.10
Self-Study	5.29	5.63	3.98
College & Non-College Classes	16.39	12.99	7.45
College & Self-Study	27.58	20.69	8.68
Non-College & Self-Study	29.66	37.30	41.21
All of the Above	0	0	17.79
Who gave you your Certificate (Q32)			
College/University	83.18	85.75	90.05
Someplace Else	16.82	14.25	9.50
Preparation for Work Experience Program (Q43)			
On-Job	31.67	27.94	22.55
College Classes	7.18	10.50	13.87
Non-College Classes	11.02	7.38	4.81
On-Job & College Classes	10.26	21.13	33.11
On-Job & Non-College Classes	17.69	11.56	8.21
College & Non-College Classes	2.44	2.41	1.89
All of the Above	19.74	19.08	15.57

The numbers in the cells are percentages which sum to 100% for each post-secondary nondegree credential by education level combination.

When asked whether the additional education was for their current job, the responses were a function of the post-secondary nondegree credential. A summary of the responses is displayed in Table 6. The numbers in the cells are percentages which sum to 100% for each post-secondary nondegree credential by STW education category.

Table 6. Is Your Post-secondary Nondegree Credential or Work Experience Program for Your Current Job?

	High School Degree or Less	Some College	Associate's Degree
Certification/License (Q14)			
Yes	71.02	67.84	74.40
Not Working	13.36	13.66	12.65
Other	15.61	18.49	12.94
Certificate (Q37)			
Yes	34.13	39.12	46.53
Not Working	28.19	26.22	20.90
Other	36.99	34.66	32.56
Work Experience Program (Q47)			
Yes	46.15	43.83	56.23
Not Working	31.67	27.73	20.47
Other	22.18	28.44	23.30

The numbers in the cells are percentages which sum to 100% for each post-secondary nondegree credential by education level combination.

As with preparation, the trends are consistent across education categories. Certifications/licenses are most often used for the current job, 68% to 74%; whereas certificates are the least, 34% to 46%.

How Useful...

For each of the three categories there is a series of questions regarding the usefulness of the most important post-secondary nondegree credential; the questions are listed in Table 7. The available responses to all useful questions were, very useful, somewhat useful, not useful, and too soon to tell. The “too soon to tell response” is not included in the following discussion since the response percentage was so small [0-9].

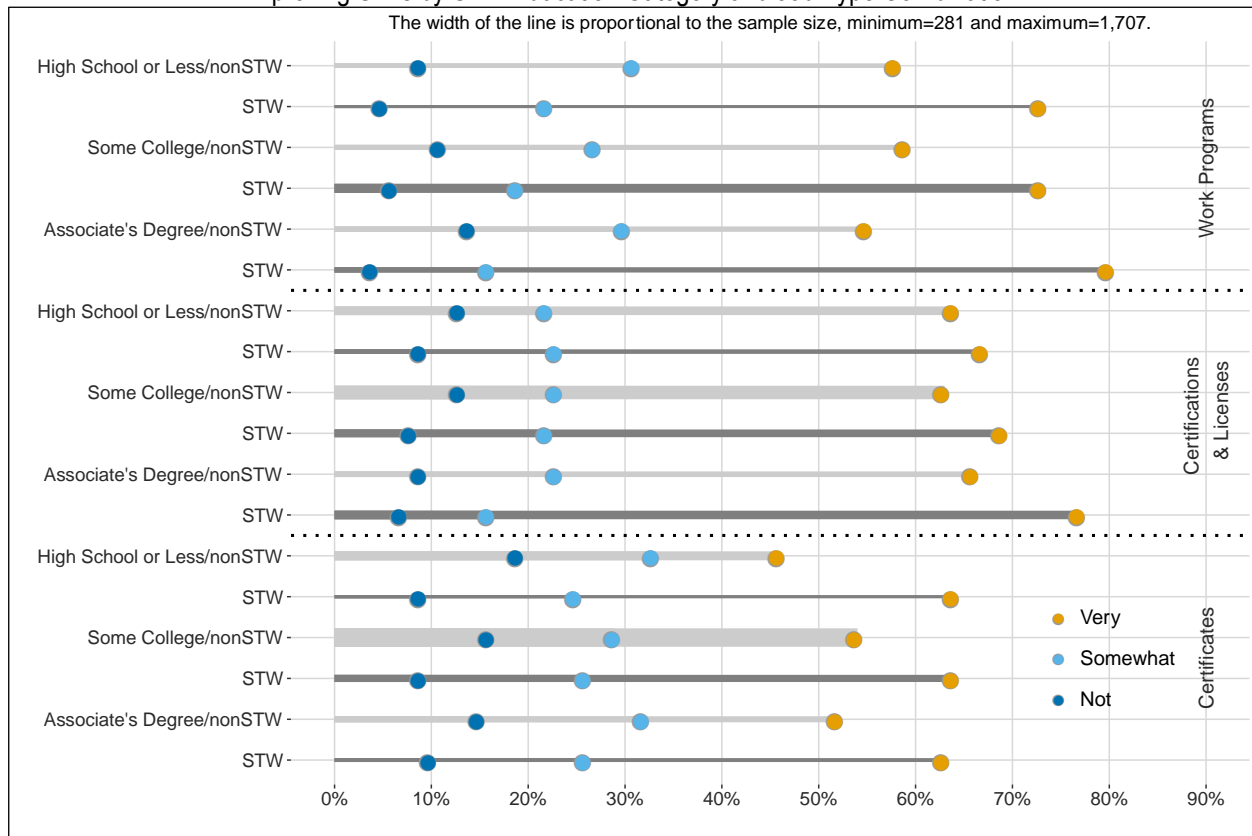
Table 7. How Useful is Your Most Important Post-secondary Nondegree Credential or Work Experience Program by Survey Question

How useful for...	Certifications & Licenses (Q15)	Certificates (Q38)	Work Experience Programs (Q49)
Getting a job	X	X	X
Increasing pay		X	X
Improving work skills	X	X	X
Keeping a job	X		
Maintaining marketability	X		

The usefulness questions responses are categorized by the STW education category and whether the post-secondary nondegree credential is for a job in the STW or nonSTW. Figure 3 displays the percentage for the two usefulness questions, getting a job and improving work skills, asked for all three post-secondary nondegree credentials.

When it comes to improving skills all three post-secondary nondegree credentials benefit workers in STW jobs more than nonSTW jobs. On average, 70% of STW employees versus 54% of nonSTW responded the additional education was very useful in improving skills. Across the three post-secondary nondegree credentials, 73% of workers that participated in work experience programs or received a license/certification found it very useful in improving skills compared to 64% who received a certificate. STW workers with a high school degree found work experience programs very useful in improving their skills, 73% compared to certificate programs, 64%. This trend was the same for workers with an associate's degree (80% versus 63%) and some college (73% versus 64%).

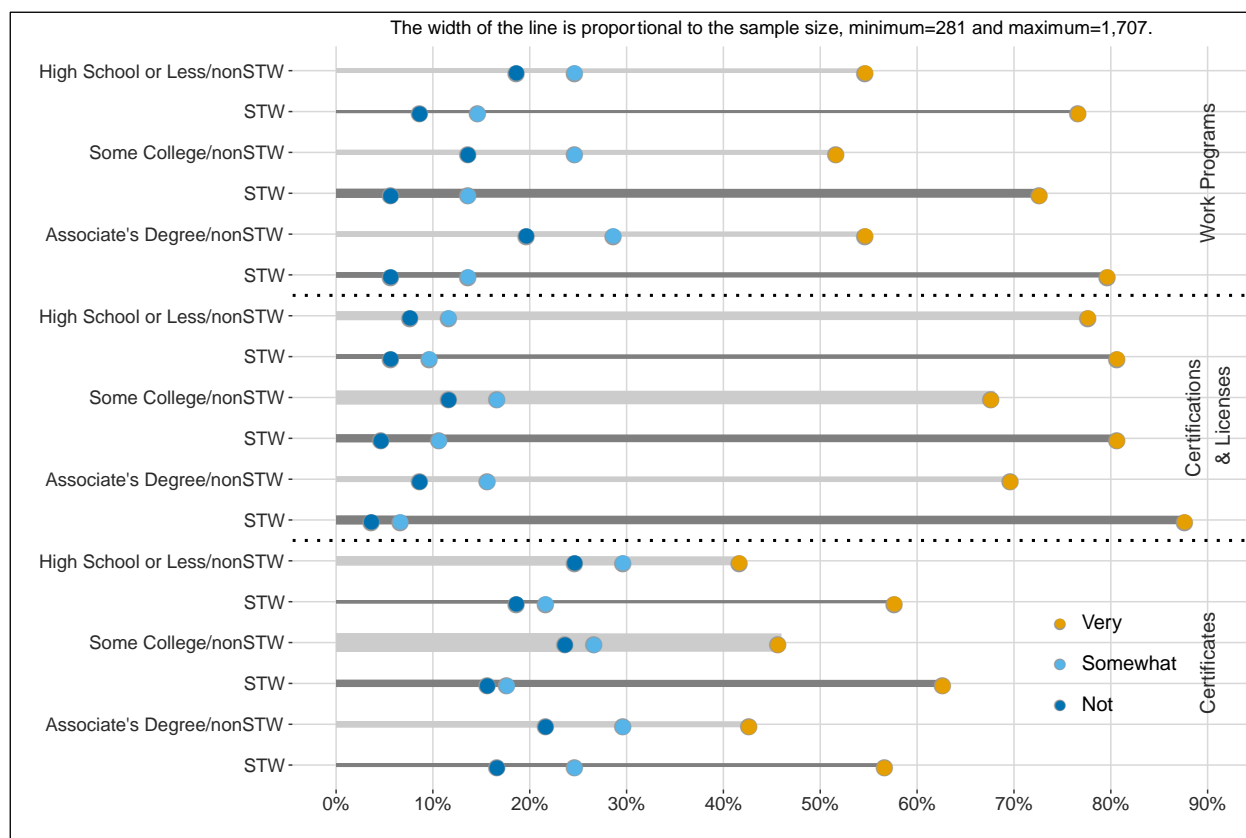
Figure 3. How Useful is the Post-secondary Nondegree Credential or Work Experience Program in Improving Skills by STW Education Category and Job Type Combination



As with improving skills, the benefits of additional education in getting a job is higher for STW job seekers than nonSTW job seekers (very useful 73% STW versus very useful 57% nonSTW) (Figure 4). STW job seekers across all post-secondary nondegree credentials reported license/certification programs the most useful (very useful = 83%) compared to work experience and certificate programs (very useful = 68%).

As with improving skills, the benefits of additional education in getting a job is higher for STW job seekers than nonSTW job seekers (very useful 73% STW versus very useful 57% nonSTW) (Figure 4). STW job seekers across all post-secondary nondegree credentials reported license/certification programs the most useful (very useful = 83%) compared to work experience and certificate programs (very useful = 68%).

Figure 4. How Useful is the Post-secondary Nondegree Credential or Work Experience Program in Getting a Job by STW Education Category and Job Type Combination

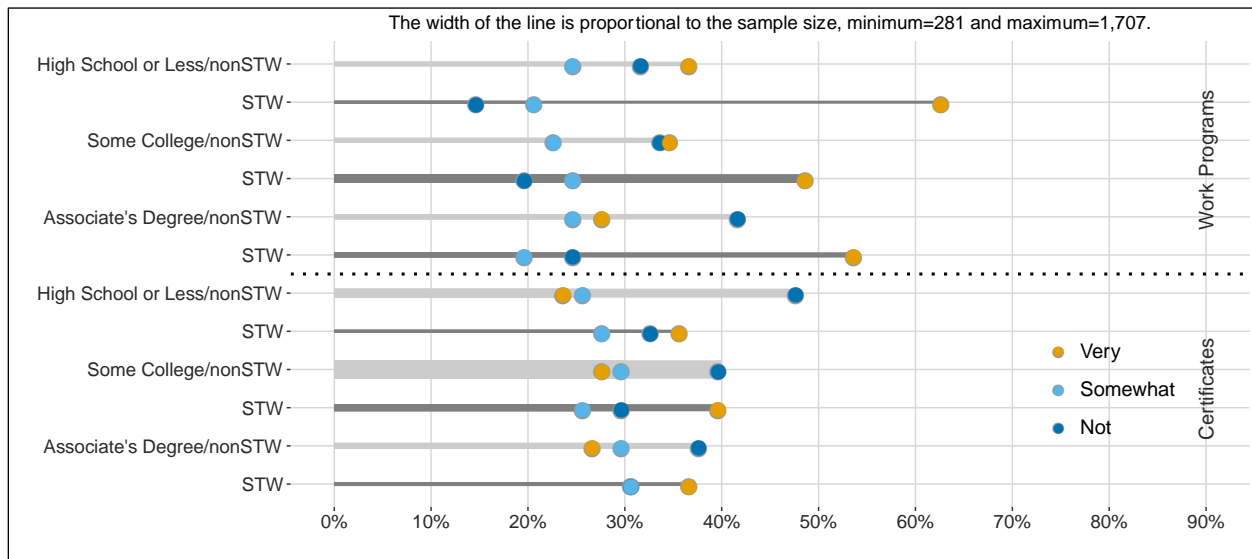


Information on how useful additional education is in increasing pay was only collected for work experience and certificate programs (Figure 5). In this case the benefits of additional education are not as pronounced as improving skills and getting a job (Figures 3 and 4). In all cases very useful for increasing pay captures the largest percentage of responses for STW workers, but in only two cases is the percentage greater than 50% (high school or less and associate's degree for work experience programs only).

With regard to the usefulness of certifications/licenses in keeping marketable and keeping a job, the percentage of STW workers that found this these nondegree credentials very useful for keeping marketable, 77% to 89%, and for keeping a job, 79% to 87%, with the largest percentage for those with an associate's degree.

Across all STW education categories and post-secondary nondegree credentials, STW occupations were judged more useful than non-STW sometimes by more than 25%.

Figure 5. How Useful is the Post-secondary Nondegree Credential or Work Experience Program in Increasing Pay by STW Education Category and Job Type Combination



Earnings Over the Last 12 Months

A more objective measure of the benefits of a post-secondary nondegree credential is to look at earnings over the last twelve months. The question regarding salary (Q62) over the last twelve months, provided respondents with nine salary intervals from [0 to \$10,000] to [\$150,001 or more] to choose from. The interval medians were used in calculating the interval means and standard errors displayed in Figure 6. What stands out is the salary benefits are a function of the STW education category, with responders with a high school degree or less benefitting the most.

- High School or Less: The responders whose post-secondary nondegree credential was used to secure a job in the STW earned on average \$15,000 more per year, than responders in the STW with no post-secondary nondegree credential. This is not true for the other two STW education categories. Responders that used their post-secondary nondegree credential to secure their current job earned more than those who did not regardless of the job type, STW and nonSTW.
- Some College: Only those responders whose certificate was used to secure a job in the STW earned more than responders in the STW with no post-secondary nondegree credential. The early average salary was comparable for responders with a certification/license that was used to secure their current a job in either the STW or nonSTW.
- Associate Degree: No responders whose post-secondary nondegree credential was used to secure a job in the STW earned more than responders in the STW with no post-secondary nondegree credential. Responders that used their post-secondary nondegree credential to secure their current job earned more than those who did not, regardless of the job type, STW and nonSTW.

But for all STW education categories and post-secondary nondegree credentials, responders who used their education to obtain their current job earn more than a responder who did not by an average of \$15,000 regardless of job type.

Figure 6. Yearly Salary by STW Education Level by Post-secondary Nondegree Credential and Work Experience Program by STW Education Category and Job Type Combination

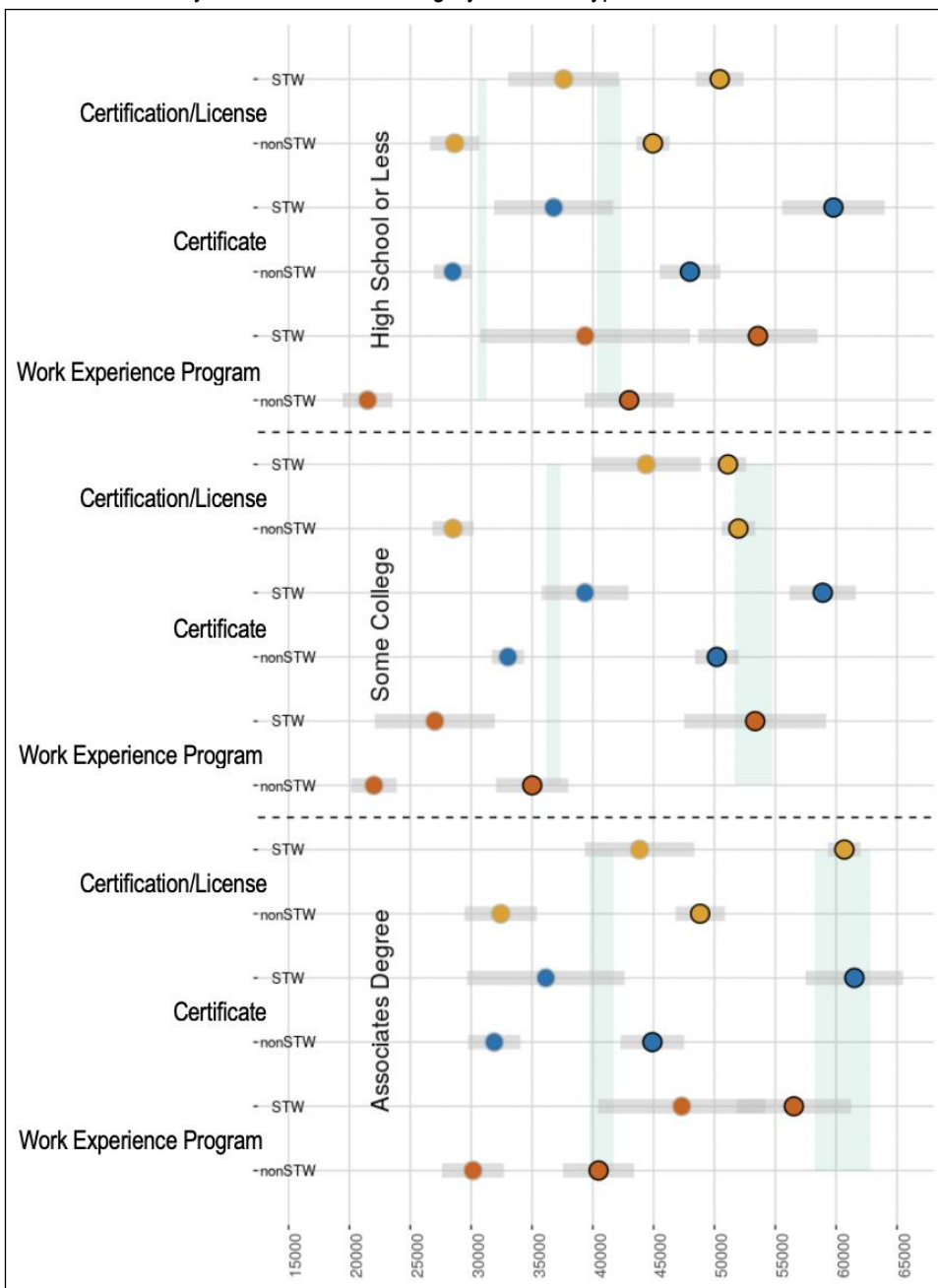


Figure Legend

The figure is organized by the three STW education categories and within these three categories are the three post-secondary nondegree credentials and within these a row for job type, STW and nonSTW.

Colored Circles: post-secondary nondegree credentials are outlined in black if used for the current job and outlined in grey if not for the current job.

Green Rectangles: represents no post-secondary nondegree credential where the width of the green rectangle is the mean \pm the standard error; the rectangles on the right are for STW jobs and the rectangles on the left nonSTW jobs.

Summary

Approximately 61 percent of the ATES respondents (N=47,744) meet the education criterion in Rothwell's definition of STW, no college degree (29,223). This paper focuses on the portion of those 29,223 respondents who had a certification/license, certificate, and/or attended a work experience program that was for their current job (referred to as the analytic group, sample size=6,960). This small sample size of the analytic group prohibits inferences outside the ATES respondents; keeping that in mind the following summarizes key findings by post-secondary nondegree credential and work experience program.

Certifications/Licenses

- Overall, approximately 50 percent of the analytic group has a certification/license that was being used in their current job. 44 percent of the jobs were in the STW and the percentage of females in these jobs was greater than the percentage of males, 55 percent versus 45 percent.
- 63 percent of the STW jobs held by females were in healthcare practitioners & technical and 27 percent of the STW jobs held by males were in installation, maintenance, & repair.
- For respondents with jobs in the STW, 71 percent found their certification/license very useful in improving their skills and 83 percent very useful in getting a job.
- 26 percent with a part-time job in the STW preferred a full-time job.
- Individuals working in the STW with a high school degree found the greatest pay benefit from their certification/license compared to individuals in the STW with a high school degree and no post-secondary nondegree credential or work experience program.

Certificates

- Overall, approximately 26 percent of the analytic group has a certificate that was being used in their current job. 38 percent of the jobs were in the STW and the percentage of females in these jobs was less than the percentage of males, 39 percent versus 61 percent.
- 45 percent of the STW jobs held by females were in healthcare practitioners & technical and 52 percent of the STW jobs held by males were in installation, maintenance, & repair.
- For respondents with jobs in the STW, 64 percent found their certificate very useful in improving their skills; 59 percent very useful in getting a job; and 38 percent very useful in increasing pay.
- 29 percent with a part-time job in the STW preferred a full-time job.
- Individuals working in the STW with a high school degree found the greatest pay benefit from their certificate compared to individuals in the STW with a high school degree and no post-secondary nondegree credential or work experience program.

Work Experience Programs

- Overall, approximately 23 percent of the analytic group attended a work experience program that was being used in their current job. 52 percent of these jobs were in the STW and the percentage of females in these jobs was the same as the percentage of males.
- 57 percent of the STW jobs held by females were in healthcare practitioners & technical and 33 percent of the STW jobs held by males were in construction & extraction.
- For respondents with jobs in the STW, 75 percent found their work experience program very useful in improving their skills; 77 percent very useful in getting a job; and 55 percent very useful in increasing pay.
- Everyone with a STW job worked full-time.
- Individuals working in the STW with a high school degree found the greatest pay benefit from their work experience program compared to individuals in the STW with a high school degree and no post-secondary nondegree credential or work experience program.

Next Steps and Future Research

The ATES survey documents the economic benefits of a post-secondary nondegree credential for individuals with a high school degree or less, yet this STW education category has the lowest attainment rate. 29 (13,879) percent of the ATES respondents have a high school degree or less but only 18 percent (2,485) in this group have any type of a

Table 8. Frequency of All Post-secondary Nondegree Credentials by Education Category

Education Category (Frequency / %)	Post-secondary Nondegree Credential Frequency	Post-secondary Nondegree Credential Percent
High School Degree (HS) or Less (13,879 / 29.06%)	2,485	17.90%
Some College (10,860 / 22.75%)	4,016	36.98%
Associate's Degree (4,484 / 9.39%)	2,011	44.85%
Bachelor's Degree (BA, BS) (11,313 / 23.69%)	3,969	35.08%
Master's Degree (5,104 / 10.69%)	2,557	50.10%
Professional Degree beyond BA, BS (1,259 / 2.64%)	1,017	80.79%
Doctorate Degree (845 / 1.77%)	315	37.27%

post-secondary nondegree credential (Table 8). These low attainment rates are comparable to a trend seen in online Massive Open Online Courses (MOOCs) offered by the University of Pennsylvania. Christensen et al. (2013) conducted an online survey of students enrolled (N=34,779) in at least one University of Pennsylvania MOOC offered through Coursera and found that more than 80 percent of the respondents had a two- or four-year degree and 44 percent had

some graduate education; students with a high school degree or less were underrepresented. The post-secondary education rates for those with a high school degree or less is an area for further research especially considering that

in a survey (N=339,047) conducted by Strada Education Network⁶ and Gallup (2019) on the value and need of post-secondary education, 59% of survey takers with less than a high school degree and 42% with a high school or GED diploma perceive they need additional education to advance in their careers. At present there are no national surveys that query adults as to the barriers to attaining a post-secondary education. Given the disparities in socioeconomic status, differences in state policies on post-secondary education, the availability and affordability of broadband and therefore online learning, and limited awareness of, and stigma to, post-secondary credentials beyond a bachelor's degree, the potential barriers are numerous and touch the domains of infrastructure, governance, and social norms.

Policies designed to boost post-secondary nondegree credential attainment need to explore this disconnect between the perceived need for additional education and the unlikelihood to enroll exhibited by those individuals at the bottom rung of the education ladder. A proposal to address awareness and stigma, is in the Workforce Information Advisory Council's (WIAC) report, *Recommendations to Improve the Nation's Workforce and Labor Market Information System*⁷. One of the Council's recommends to the Secretary of Labor is to "... develop, disseminate, and regularly update a K-12 career awareness educational framework to address the career awareness gap and increase public understanding of career pathways and options starting at an early age." Their rationale is the public's lack of awareness about the jobs and career pathways that can lead to economic security that do not require a four-year college degree. Young people are often unaware of the alternatives to a four-year degree such as apprenticeship employment and training, technical education, work-based learning opportunities, coding bootcamps, and MOOCs since career counseling in high schools tend to encourage students toward a four-year college degree. More immediately the lack of awareness will be informed by the nonprofit Ad Council working. Working with IBM, Apple, and the White House, the Ad Council is launching a yearlong national advertising campaign that promotes postsecondary degree alternatives. Their ads will "Inform 16-20 year-olds and those who influence them regarding the multiple pathways available to secure well-paying jobs and successfully navigate the rapidly changing nature of work. Counter perceptions that a traditional college education is the only or primary vehicle for career success. Convey that there are new, innovative learning models providing multiple avenues for career success, opportunity, and economic and social mobility."⁸ The ads are scheduled to begin in early 2020.

In 2020 the National Training, Education, and Workforce Survey (NTEWS) will replace the ATES with a rotating panel design that begins with a pilot of 40,000. Additional questions regarding the reasons for education attainment and for attaining a credential will be added as well as more focused questions on a responder's job title, activities, employer

⁶Strada Education Network <https://www.stradaeducation.org/> Accessed December 15, 2019

⁷ Workforce Information Advisory Council: https://www.doleta.gov/wioa/wiac/docs/WIAC_Recommendations_Report_2018-01-25_Final_and_Signed.pdf Accessed February 24, 2020

⁸American Workforce Policy Advisory Board: https://www.commerce.gov/sites/default/files/2019-09/AWPAB1_Pathways_Campaign_working_group_Sept18_recommendations_FINAL.pdf Accessed February 24, 2020

characteristics, and job satisfaction. Over sampling of underrepresented groups in the STW and science and engineering will rectify the small sample sizes seen in the ATES; by 2028 the NTEWS will reach a sample size of 140,000.

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