brief insights

Credentials to Compete: Foundation for Tracking Progress

The US economy has shifted in recent decades to a service economy, where the pathway to a good job is no longer through a high school diploma. Increasingly, research shows that jobs within this new economy require some form of postsecondary education, but not necessarily a bachelor's degree.

Recognizing this, Governor McAuliffe has undertaken a number of initiatives to reshape Virginia's workforce into one that is better adapted to today's economic realities, including a goal for Virginia to produce 50,000 Science, Technology, Engineering, Math, and Health Care (STEM-H) workforce credentials, as well as longer-term goals for credential attainments that extend beyond STEM-H.

This Brief Insight will focus on these specific workforce credentials initiatives and the methods Virginia is using to track progress towards our credential goals.

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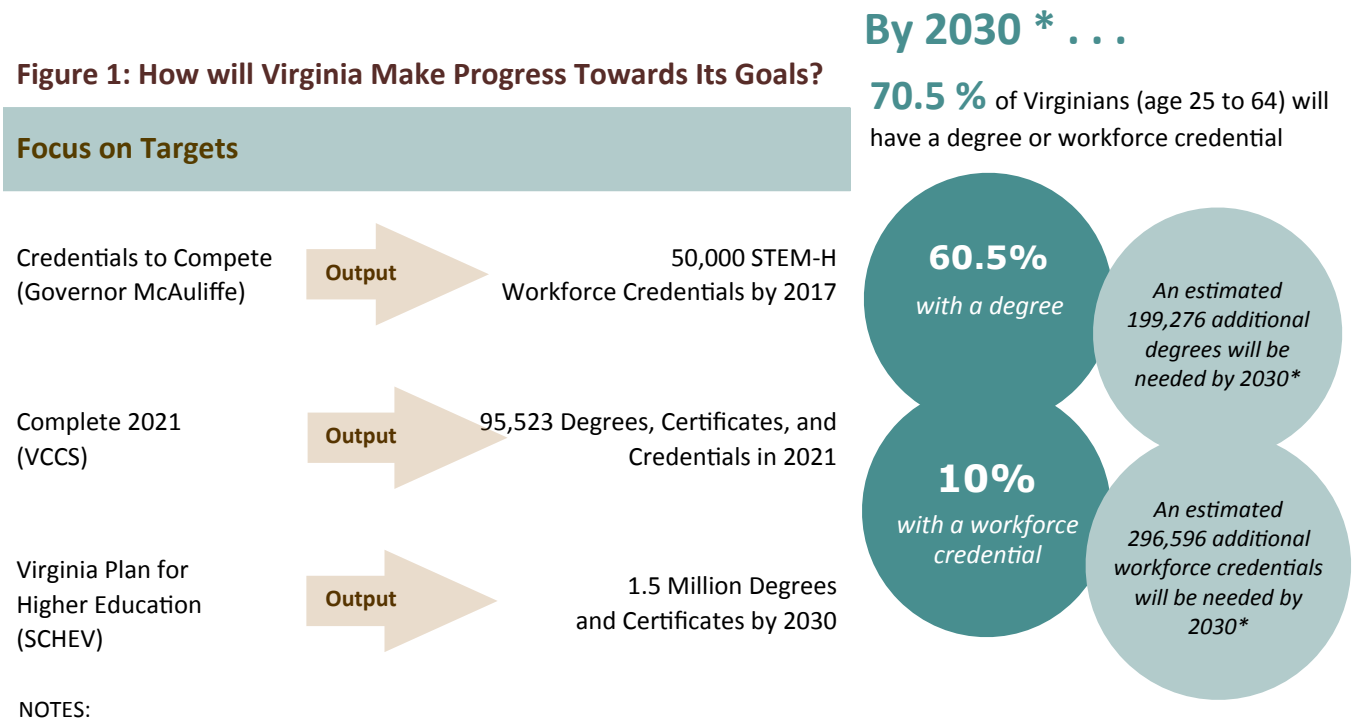
Introduction

The shift in recent decades to a more service-based economy in the US has changed the requirements and demands it makes on the American workforce. A high school diploma is no longer adequate for many good-paying jobs. Yet a 4-year college degree isn't always what's required, either. As a result, Governor McAuliffe included a goal to produce 50,000 STEM-H (Science-Technology-Engineering-Math-and-Health Care) workforce credentials in Executive Order 23: Establishing The New Virginia Economy Workforce Initiative. *(Note: Some health care is usually included within most STEM definitions without overtly stating it. Adding the "H" at the end has become a standard practice in Virginia. The acronyms are used interchangeably throughout the remainder of this report.)*

In addition to the Governor's short-term target, the Council on Virginia's Future, the Virginia Business Higher Education Council, the Secretary of Commerce and Trade's Office, the State Council of Higher Education for Virginia (SCHEV), and the Virginia Community College System (VCCS) partnered to develop a long-term goal for workforce credential attainment that extends beyond STEM-H. Announced in September 2014, this goal calls for 10 percent of working-age Virginians to hold a workforce credential of value by 2030. Initial estimates show that 461,000 Virginians will hold these credentials in 2030 if this goal is met.

Currently, the initial work from 2014 is in the process of being updated, in collaboration with Georgetown University's Center on Education and the Workforce. Preliminary work from the revision

Figure 1: How will Virginia Make Progress Towards Its Goals?



NOTES:

* Collaboratively developed by the Virginia Business Higher Education Council, the Council on Virginia's Future, the Secretary of Commerce and Trade's Office, the State Council of Higher Education for Virginia, and the Virginia Community College System.

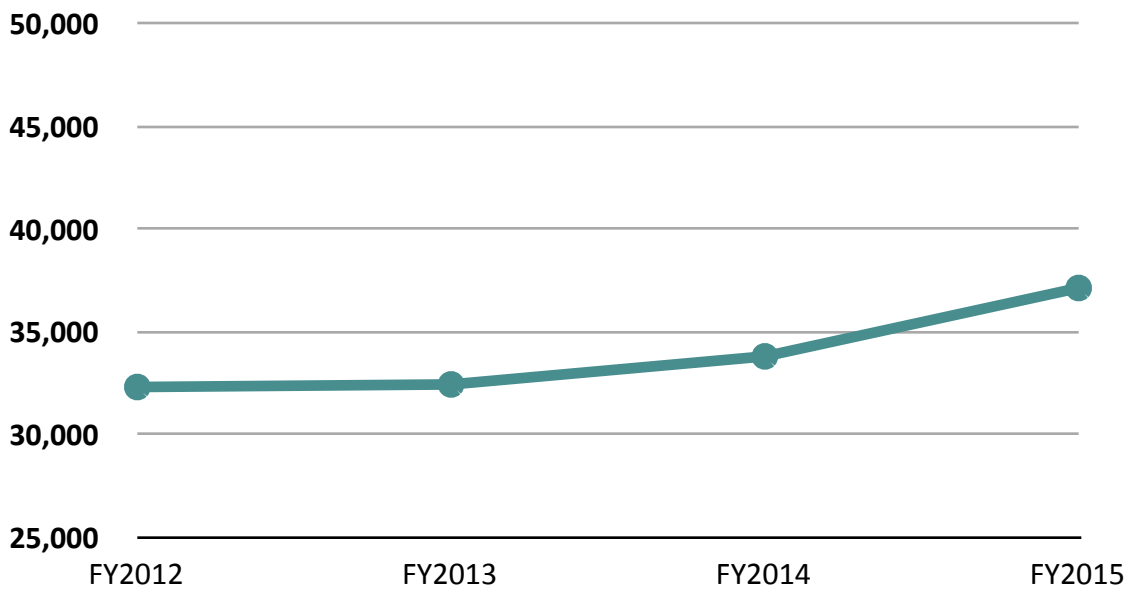
process estimates that six percent of Virginians have an industry certification or certificate of value (respectively, earnings premiums of 20% and 8% compared to high school) and no degree.

Figure 1 on page 2 illustrates how each of Virginia's workforce targets relate to the broader, collaboratively developed population-based goals. Each credential produced and tracked through the Governor's 50,000 STEM-H target, VCCS's *Complete 2021*, and SCHEV's *Virginia Plan for Higher Education* will put Virginia in a stronger position to reach its population-based goals by 2030.

As a foundational step to strengthening how Virginia tracks workforce credentials, the Council on Virginia's Future provided technical support to the Secretary of Commerce and Trade's Office in assessing progress on the Governor's 50,000 STEM-H target. Several approaches to defining STEM and no central resource for workforce credential information made developing an approach a challenge.

Initial analysis shows progress is being made towards the Governor's target, with 9 percent growth from FY 2014 to FY 2015. Virginia produced 37,128 workforce credentials in FY 2015 that can lead to employment in occupations that require a high degree of STEM skill; offer average wages above $34,400; and do not require a bachelor's degree for employment (see Figure 2). In August 2016, the Secretary of Commerce and Trade's Office will send another survey to Virginia's state agencies to assess progress towards the Governor's 50,000 STEM-H target.

Figure 2: Progress Towards the Governor's 50,000 STEM-H Target



Work to strengthen how Virginia can collect and count better information on credentials will continue to evolve. Pending issues for workforce credentials include:

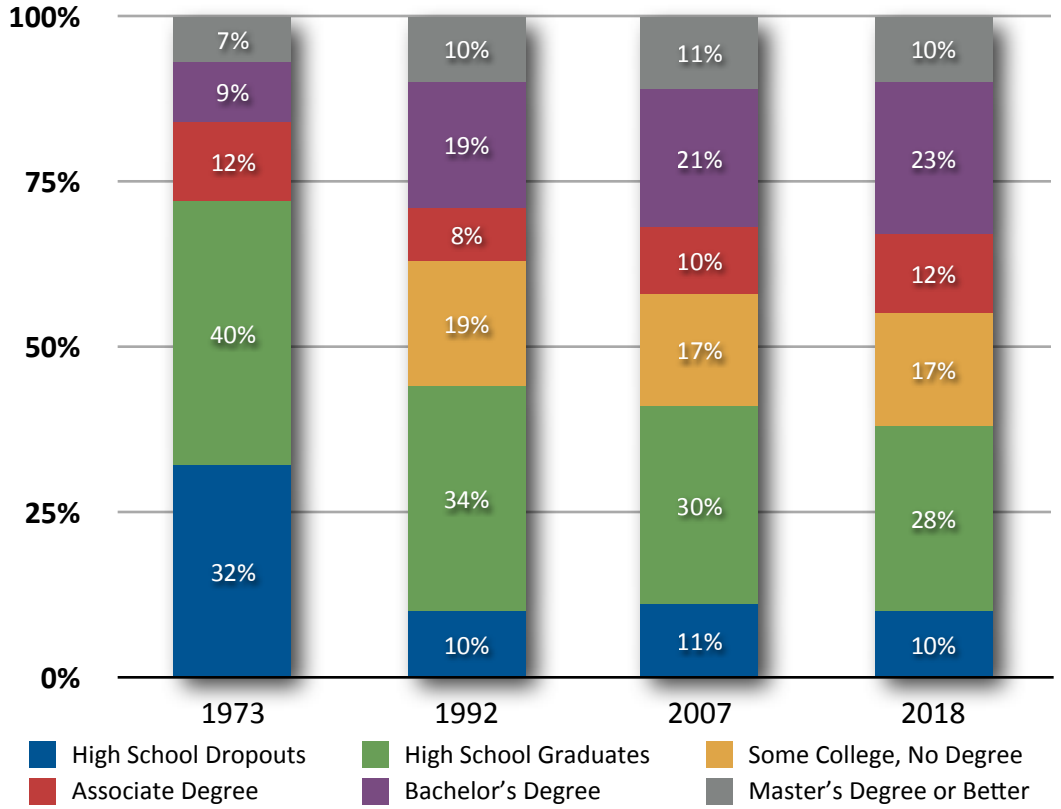
- Tracking industry certifications embedded in or stemming from Virginia's credit and non-credit bearing programs;
- Including proprietary institutions in broader counts of credentials;
- Understanding industry certifications that are earned without entry into a training program;
- Linking credentials more clearly to employer demand;
- Developing a high-value list of industry certifications for Virginia's public educators and trainers;
- Incorporating all workforce credential information into Virginia's Longitudinal Data System to more clearly understand outcomes related to workforce credentials.

Background

Virginia's Need for Workforce Credentials

The US economy has shifted in recent decades from a goods-producing economy to a post-industrial service economy. Consequently, the types of workers needed to support the jobs required in this new economy have shifted from workers with a high school degree to those with some form of postsecondary education (see Figure 3).

Figure 3: Job Requirements in the US by Education Level



Source: Carnevale, A. Smith, N., and Strohl, J. (2010, July). *Help Wanted: Projections of Jobs and Education Requirements Through 2018.* Center on Education and the Workforce: Georgetown University.

Research from Georgetown University's Center on Education and the Workforce and the Economic Studies section of the Brookings Institution argue that the US has not experienced a "hollowing out" of middle-skill jobs with the decline of the industries that dominated the industrial era. Jobs in the middle have rather shifted to require a higher degree of skills, due in part to changes in how goods are produced (i.e. technology) and shifts in consumption patterns. In a recent white paper, Dr. Harry Hozler shows that between 2000 and 2013 traditional middle-skill jobs declined, while new middle-skill jobs grew slightly over the same period. These new jobs include health care technicians; paralegals; and installation, maintenance and repair technicians. He further predicts these jobs will continue to grow as the US recovers from the Great Recession.

Middle-skill jobs usually require some form of postsecondary education beyond high school. Analysis from Dr. Steve Fuller with George Mason University's Center for Regional Analysis predicts Virginia will have close to 1.5 million job openings between 2013 and 2023. Furthermore, his work predicts that a majority (50% to 60%) of these openings between 2012 and 2022 will require education or training beyond high school, but less than a four year degree; most of these individuals fall into the "some college" category shown in Figure 3 on page 4.

Responding to the Need

Recognizing the finish line for a good-paying job is no longer high school, Virginia has focused on strengthening its workforce system to produce workforce credentials for middle-skill occupations.

Figure 4: Workforce Credential Types Organized by Broad Category

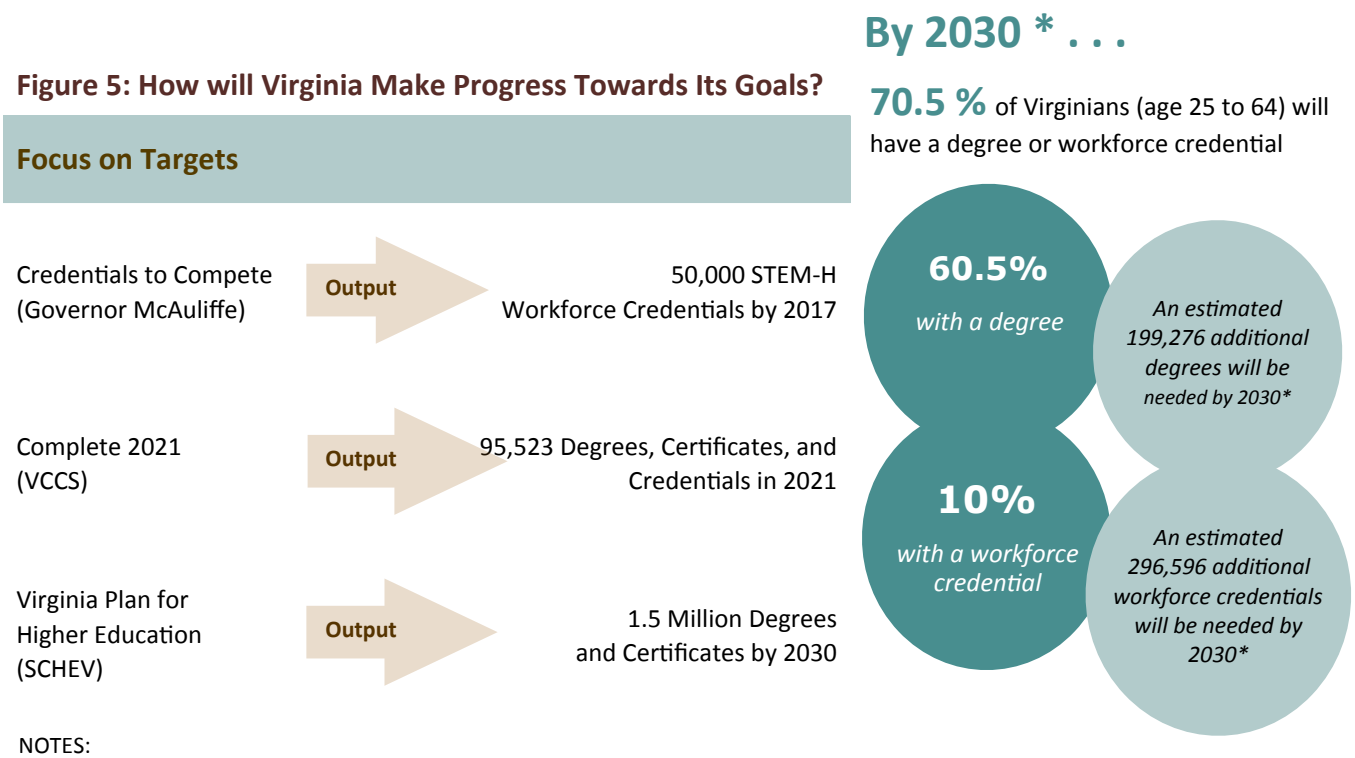
Academic Based	Certificates *(Below bachelor's degree)*	Associate of Applied Science Degrees
Earned by	Completing an academic program of study	Completing an academic program of study
Government/Regulatory Based	Registered Apprenticeship	Licenses
Earned by	Completing a program of study and on-the-job training approved by the US Department of Labor	Completing pre-determined requirements set by a regulatory board
Business, Trade Association, or Other Industry Group Based	Industry Certifications	
Earned by	Completing and demonstrating knowledge on a test created by a third party, plus work experience (in certain cases)	

Governor McAuliffe has made workforce one of his top priorities, with specific focus on credentialing, aligning supply and demand, and generating skills for The New Economy. Released in August 2014, *Executive Order 23: Establishing The New Virginia Economy Workforce Initiative* calls for the production of 50,000 STEM-H workforce credentials over the course of Governor McAuliffe's tenure (see Appendix A for a copy). Workforce credentials in this executive order include industry certifications, postsecondary academic certificates, licenses, registered apprenticeships, and associate of applied science degrees (see Figure 4, p. 5 for definitions).

The focus on STEM-H workforce credentials corresponds with many of the Governor's target industries for growth, such as advanced manufacturing, cyber security, life sciences, and information technology. Additionally, about a year ago the Brookings Institution released a report, called *The Hidden STEM Economy,* that showed over half of STEM jobs are available to workers without a four-year college degree and offer a 10 percent earnings premium when matched against jobs with similar education requirements.

At the same time the Governor articulated his STEM-H target for credential production, the Virginia Business Higher Education Council, the Council on Virginia's Future, the Secretary of Commerce and Trade's Office, SCHEV, and VCCS collaborated to update Virginia's goal for degree attainment. By 2030, 60.5 percent of Virginians (age 25-64) will have an associate degree or bachelor's degree. Additionally, this work group understood the importance of workforce credentials for Virginia's economy and

Figure 5: How will Virginia Make Progress Towards Its Goals?



NOTES:

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included a target for at least 10 percent of working age Virginians (age 25-64) to hold a workforce credential (industry certification, registered apprenticeship, license, or postsecondary academic certificate) by 2030. The National Center for Higher Education Management Systems (NCHEMS) produced the analysis for both goals, using work from Georgetown University's Center on Education and the Workforce (CEW) for the 10 percent workforce credential goal.

Initial estimates from NCHEMS show Virginia will need to credential an additional 296,770 Virginians between 2012 and 2030 to reach its 10 percent goal. Reaching this goal means 461,000 working age Virginians in 2030 will have a workforce credential that offers a higher earnings premium compared to high school. Given newly available federal data, work is underway, in partnership with CEW, to re-estimate the initial baseline used for the 10 percent goal. CEW now estimates that six percent of Virginians already hold a certificate or industry certification of value.

Moreover, in late 2014, Virginia's education agencies – VCCS and SCHEV – were undergoing a six-year strategic planning process. Each plan articulates a target for workforce credential production. In fact, the VCCS's strategic plan, *Complete 2021,* has one goal: to triple the number of degrees, certificates, and credentials it awards annually by 2021. Under their definition, it is estimated Virginia's Community Colleges will produce 95,523 degrees, certificates, and credentials in 2021. Likewise, SCHEV's strategic plan – *The Virginia Plan for Higher Education* – calls for the production of 1.5 million degrees, certificates, and credentials by 2030 and aligns with the 2030 goals discussed above.

Figure 5 (p. 6) summarizes how Virginia's workforce targets and goals relate to one another.

Discussion

The Secretary of Commerce and Trade's Office, with technical support from the Council on Virginia's Future, developed an approach for quantifying progress on the Governor's goal to produce 50,000 STEM-H workforce credentials by the end of 2017. Given the limited data available on credentials, coming up with an approach was challenging (see Appendix B for an overview of the data challenges to counting credentials). The discussion below summarizes our initial effort to assess progress on the Governor's STEM-H target and provides a foundation for future work.

Defining STEM-H

STEM-H is a rather ubiquitous acronym in the education and workforce policy conversation. But as many researchers have pointed out, this acronym can be problematic, particularly since there is no standard definition of a STEM occupation. A recent report from the Wisconsin Center for Education Research analyzes the differences between six ways to define STEM occupations. *(Note: Some health care is usually included within most STEM definitions without overtly stating it. Adding the "H" at the end has become a standard practice in Virginia. The acronyms are used interchangeably throughout*

this report.) Each definition produces significant differences in job, wage, and education estimates. For example, STEM job estimates in the US can vary from 5.4 million to 26 million jobs, depending on the definition used.

In addition to occupations, STEM can be defined via industries and education programs. STEM industry-based definitions can be problematic for workforce and education training decisions, since jobs within industries vary and may or may not relate to STEM. Likewise, STEM definitions exist for education programs, such as those found at the National Science Foundation and SCHEV.

For purposes of quantifying the Governor's 50,000 STEM-H target, an occupation-based definition seemed appropriate, due to the Governor's emphasis on tying education and training to jobs and economic development. As mentioned earlier, there are a number of definitions for STEM occupations. The Secretary of Commerce and Trade's Office selected a definition developed by Jonathan Rothwell with the Brookings Institution in his report, *The Hidden STEM Economy.* This definition was selected for a number of reasons:

1. It is much broader than other definitions of STEM occupations, with US estimates for jobs under this definition at 26 million.
2. It includes workers in blue-collar jobs that typically require a workforce credential below a bachelor's degree.
3. It bases its definition of STEM on the knowledge and skills required of an occupation, as opposed to the work tasks of a job.

Rothwell's analysis identified occupations as being high-STEM (a high STEM knowledge score in one STEM area) and super-STEM (a high STEM knowledge score across all areas of STEM). It should be noted the "H" for health care is accounted for within Rothwell's scoring process and analysis.

Surveying State Agencies

In August 2015, the Secretary of Commerce and Trade's Office sent a survey on workforce credentials to those Virginia state agencies with relevant data. In completing the survey, agencies were asked to crosswalk workforce credentials to the list of STEM occupations identified by *The Hidden STEM Economy*. This list of occupations was further filtered by the variables of average wage (above $34,400 – a 20 percent premium over the average wage made by an individual with a high school diploma in Virginia) and education (at least a high school diploma or equivalent and below a bachelor's degree). Narrowing the list of STEM occupations by these two variables allowed the survey to target middle-skill occupations to the best extent possible. (Appendix C provides the list of these occupations.)

Workforce credentials surveyed include industry certifications, licenses, registered apprenticeships, postsecondary academic certificates (excluding post-baccalaureate certificates), and associate of

applied science degrees. Figure 6 below shows what data agencies supplied for this report. To help with the occupation-to-workforce credential alignment, agencies were given links to O*NET and Career One-Stop resources. For each credential, agencies were asked to provide the name of the credential, its internal agency data classification code, the issuer (in the case of industry certifications), and the number of new awards (not graduates) for fiscal years 2012 through 2015.

Asking for this level of detail and understanding how agencies aligned credentials to occupations was particularly important for industry certifications that do not have a standardized crosswalking methodology. The instructions included criteria for agencies to consider when reviewing industry certifications for inclusion, such as industry recognition, portability, competency based, and third party validation. Staff from the Council on Virginia's Future and Secretary of Commerce and Trade's Office provided technical support to agencies throughout the survey period. Appendix D provides the survey instructions given to state agencies.

Agencies submitted their surveys at the beginning of September 2015. Each survey was reviewed by staff from the Council on Virginia's Future and the Secretary of Commerce and Trade's Office and follow-up was initiated where appropriate. In addition to their surveys, agencies could submit additional credentialing data that did not necessarily align to an occupation on the list for possible inclusion into the totals. Staff reviewed this supplemental information and a few relevant credentials were included in the final analysis.

Figure 6: State Agencies with Workforce Credential Data

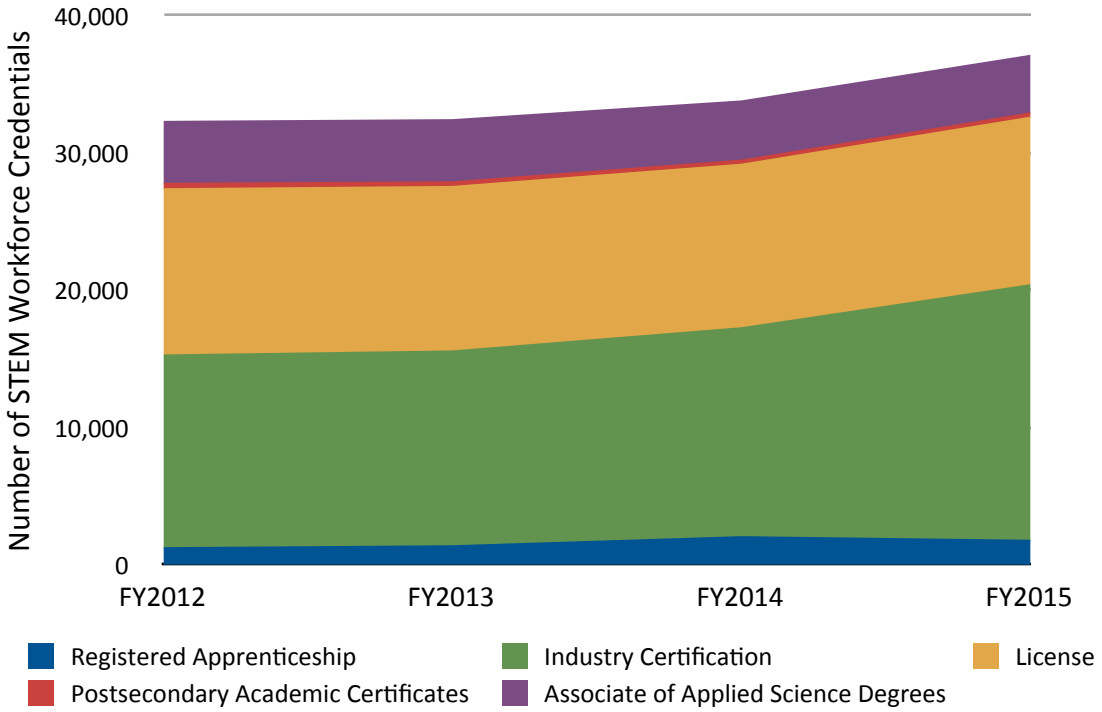
State Agency	Supplying Data On
State Council of Higher Education for Virginia	Postsecondary Academic Certificates, Associate Degrees
Virginia Community College System	Postsecondary Academic Certificates, Associate Degrees, Industry Certifications (limited)
Virginia Department of Education	Industry Certifications
Virginia Department of Health Professions	Licenses
Virginia Department of Labor and Industry	Registered Apprenticeships
Virginia Department of Professional and Occupational Regulation	Licenses, Certifications

Results

An analysis of the data collected through the state agency survey shows that in 2015 Virginia produced 37,128 credentials which provide a pathway to a job requiring a high degree of STEM knowledge. *(Note: This number reflects a duplicated count, since not all workforce credential data sets have been integrated into the Virginia Longitudinal Data System [VLDS] that would allow for de-duplication.)* Virginia's 2015 figure represents nine percent growth over FY 2014, demonstrating improvement towards the Governor's goal to produce 50,000 STEM-H workforce credentials. Figure 7 below shows credential growth from FY 2012 to FY 2015, with FY 2014 representing the baseline year for assessing progress towards the Governor's target (*Executive Order 23* was released a month after the close of FY 2014).

Figure 7: STEM-H Workforce Credentials in Virginia

Type	FY2012	FY2013	FY2014	FY2015
License	12,105	11,980	11,909	12,200
Registered Apprenticeship	1,276	1,416	2,079	1,814
Industry Certification	14,032	14,186	15,212	18,609
Postsecondary Academic Certificates	391	336	297	313
Associate of Applied Science Degrees	4,514	4,525	4,309	4,192
Total	**32,318**	**32,443**	**33,806**	**37,128**



As shown on page 10, industry certifications were responsible for a majority of the growth between FY 2014 and FY 2015: In FY 2015, industry certifications improved by 3,397 from FY 2014. While other types of credentials remained flat or dropped off, industry certifications have improved each year over the survey period. Most of these industry certifications reflect those earned by Virginia's secondary Career and Technical Education students, with a few earned by participants in community college non-credit programs included in FY 2015. (Work is underway to collect more industry certification data.)

Licenses saw slight improvement from FY 2014 to FY 2015, growing from 11,909 to 12,200 licenses. After three years of improvement, registered apprenticeships fell to 1,814 in FY 2015. Postsecondary academic certificates saw slight improvement in FY 2015 after three years of steady decline, improving from 297 in FY 2014 to 313 in FY 2015. Associate of applied science degrees declined over the four year period, dropping from 4,514 in FY 2012 to 4,192 in FY 2015.

Moving Forward

Virginia's education and training community needs to produce over 12,000 credentials to reach the Governor's STEM-H target. In August 2016 the Secretary of Commerce and Trade's Office will send another survey to Virginia's state agencies to assess progress towards the Governor's 50K STEM-H target, using a similar approach to the 2015 request. Feedback from stakeholders is welcome to refine the methodology for next year's report.

The Governor's workforce credential target has proved aspirational for Virginia's education and training community to focus more intensely on pathways to employment that do not require a bachelor's degree and to improve how Virginia can collect and analyze data on workforce credentialing. Since the Governor released this target, multiple agencies have started to track the credentials earned by participants in their programs.

This report represents a foundation for counting credentials with available, accessible data. Virginia can continue to build on this work to further understand workforce credentials in a much broader context. Pending issues for further exploration include:

- Tracking industry certifications embedded in or stemming from Virginia's credit and non-credit bearing programs;
- Including proprietary institutions in broader counts of credentials;
- Understanding industry certifications that are earned without entry into a training program;
- Linking credentials more clearly to employer demand;
- Developing a high-value list of industry certifications for Virginia's public educators and trainers; and,
- Incorporating all workforce credential information into Virginia's Longitudinal Data System to more clearly understand outcomes related to workforce credentials.

Exploring these remaining challenges will be the focus of Virginia's education and training research and data partners, as work begins to assess progress towards Virginia's 2030 goals that will extend beyond STEM-H.

References

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Appendix A: Executive Order 23

Commonwealth of Virginia
Office of the Governor

Executive Order

NUMBER TWENTY THREE

ESTABLISHING THE NEW VIRGINIA ECONOMY WORKFORCE INITIATIVE

Importance of the Initiative

With its favorable economic climate, quality of life, regulatory environment, and low unemployment rate, Virginia has been designated as the best state for business. Also named the Best State for STEM Jobs, Virginia has the highest concentration of high tech jobs per capita in the nation. In light of these positive factors, it is critical to prepare for changes to Virginia's employment marketplace and retiring workforce.

A new workforce agenda is required to fill jobs of today and the future. Based on current estimates, by 2022, about 500,000 new jobs will be created in Virginia. Over 930,000 workers will be needed to replace Virginia's retiring workforce. Many of these jobs will be in scientific, technical, or healthcare careers, and will require postsecondary education or workforce credentials. Careers in these fields are readily accessible for those who are trained, credentialed, and ready to work. However, we do not have enough tech-savvy frontline workers.

The Commonwealth must devise a long-term, comprehensive plan to equip our workforce with in-demand skill sets that will retain and attract businesses. It is crucial for enough students to graduate from Virginia's educational institutions to meet the demands from current and prospective employers. Employers must be engaged to determine current and future employment needs.

As Chief Executive Officer and Chief Workforce Development Officer for the Commonwealth of Virginia, and in furtherance of my commitment to workforce development and training, I am dedicated to ensuring that all Virginians are afforded access to a world class education and workforce system. Therefore, in consultation with the Secretary of Commerce and Trade, Chief

Workforce Development Advisor, I am directing Virginia's Workforce Development System ("Workforce System"), including the Department for Aging and Rehabilitation Services, Department for the Blind and Vision Impaired, Virginia Community College System, Virginia Economic Development Partnership, Virginia Department of Education, Virginia Employment Commission, Department of Labor and Industry, Department of Social Services, as well as the Virginia Board of Workforce Development, local Workforce Investment Boards ("WIBs"), and other state agencies as identified below to take immediate action to marshal the Commonwealth's education and training resources.

Establishment of the Initiative

Accordingly, by virtue of the authority vested in me as Governor under Article V of the Constitution of Virginia and under the laws of the Commonwealth, and subject to my continuing and ultimate authority and responsibility to act in such matters, I hereby create Establishing the New Virginia Economy Workforce Initiative.

Actions to Drive Virginia's Workforce System

This Executive Order requires Virginia's Workforce System to take the following immediate actions:

1. Establish annual goals and identify opportunities to increase statewide attainment rates of credentials that align with employer needs.

   Specialized, skilled, and technical jobs at the technician level currently comprise about 45% of Virginia's labor market. The required training for these jobs is usually acquired through community college degrees, certificate programs, apprenticeships, certifications, licenses, or other career-related credentials. As the demand for new workers with specialized skills increases, the Commonwealth must act quickly to address industry needs, fill the workforce gap, and foster new opportunities.

   - "Pathway to 50K" – Virginia will set a goal of attaining 50,000 STEM-H credentials, licenses, apprenticeships, and associate degrees that meet the immediate workforce needs during my administration. Many of these jobs will have high individual wages and bring a substantial return on investment to the gross state product.

   - Action Item: By October 31, 2014, state agencies including the Department for Aging and Rehabilitative Services, Department of Education, Department of Labor and Industry, Department of Social Services, Virginia Community College System, and local WIBs must each produce a report for the Secretary of Commerce and Trade that will incorporate the current workforce credential attainment levels from FY2013, and regional business and industry needs. After reviewing the baseline data, each agency and WIB will establish an annual goal and strategies for the next three years to increase attainments rates and identify barriers to credential attainment to meet the Governor's goal of 50,000 credentials. The reports must also identify opportunities to take immediate action for changing state policies, funding, or applying for federal waivers to increase credential rates. In addition, local WIBs will work with local businesses and industry sectors, local chambers of commerce, and local community colleges to identify and prioritize those workforce credentials most in demand by employers in the WIBs'

regions. Transparency of credential attainment will be provided by an online Commonwealth Scorecard of Economic Opportunity that will be hosted by the State Council for Higher Education of Virginia.

- Action Item: By December 31, 2014, the Secretary of Commerce and Trade will approve a plan for implementing new statewide common metrics and methods of measuring postsecondary education/workforce credential attainment, employment, wages, professional mobility, and return on investment. Currently, the only established performance metrics for most of Virginia's publicly funded workforce programs are those from various federal agencies. To better align Virginia's workforce programs with a common goal of continued economic development, the state will, for the first time, introduce common performance metrics for all publicly funded workforce programs.

2. Create seamless transitions for Virginia's veterans by providing high quality education and workforce services that accelerate career opportunities.

At present, over 840,000 veterans reside in Virginia. Since 2000, Virginia has had high growth in its veteran population, and, more specifically, those veterans under the age of 25. With a strong military presence, defense activities, and civilian contractors, Virginia is a leader of veteran employment strategies through the Department of Veteran Services' Virginia Values Veterans (V3) program. V3 educates employers to recruit, hire, and retain veterans. However, more resources and services are needed to enhance this program. In addition, actual skill sets and academic transcripts must be quickly evaluated for transferability. Virginia must take a multifaceted approach to building a comprehensive veteran workforce services initiative.

- "Our Patriot Pledge" - Virginia will request that 10,000 businesses sign pledges of commitment for hiring our veterans. In addition, by the end of the administration, Virginia will double the number of veterans hired through the V3 program.

- Action Item: By November 30, 2014, the Secretary of Commerce and Trade, in consultation with Virginia's Workforce System, the Secretary of Education, the Secretary of Veterans and Defense Affairs, the Department of Veterans Services, and each of the education and workforce development agencies and programs within Virginia's Workforce System will present a plan to the Governor on how to recruit and retain veterans in Virginia. The plan will outline how Virginia will convert military experience and training into academic or workforce credentials, simplify and accelerate the education and workforce credentialing process toward a career, create online portals with information and services that support the transition process, and build an awareness of careers and services that Virginia offers as the preeminent state for veterans.

3. Diversify the economy by providing workers with skills to meet new private sector needs, encouraging innovation through entrepreneurship, retooling regions for economic advancement, and educating Virginia's workforce for the future.

Roughly thirty percent of Virginia's economy is tied to the federal government. Virginia needs to strengthen its economy by encouraging the growth of robust industry sectors that do not rely on government contracting or grant funding.

- "A Diversified Dominion" – Virginia will seek to diversify the economy by increasing support for small businesses, start-ups, entrepreneurial ventures, and patent production. The Commonwealth can help advance current industries, while recruiting new ones to maintain our global strength.

- Action Item: The Secretary of Commerce and Trade will work closely with the Virginia Economic Development Partnership, state and local chambers of commerce, trade associations, and Virginia's Workforce System to set a vision for Virginia's future economy. Local, state, and national business trends and forecasts will be evaluated to help shape next steps to retain Virginia's current and future competitive edge. These short-term and long- term goals, recommendations, and strategies will be submitted in a report to the Governor's Office by no later than December 1, 2014.

4. Align workforce supply to current and anticipated employer demands by constructing career pathways and training solutions for the dislocated, underemployed, and future worker.

Virginia will align its workforce supply to current and anticipated employer demands by constructing career pathways and training solutions for the dislocated, underemployed, and future worker. Currently, tens of thousands of jobs are left unfilled in Virginia due to the creation of new jobs and positions available from the recently retired. In Virginia's metropolitan areas, job vacancies for highly skilled and high tech workers average over a month to fill, while a single job in rural Virginia might garner hundreds of applications. Education attainment requirements also differ from industry to industry and can be regionally specific.

- "Real-Time Resources" – Virginia will create the Commonwealth Consortium for Advanced Research and Statistics (CCARS) for workforce and education policy. CCARS will support education and workforce entities through analysis and research to help drive economic development in the Commonwealth. This consortium will provide real-time data about human capital, regional skills gaps, local and state wage data, university research and talent, and availability of local and state workforce programs. The availability of data will increase outcomes-based decision-making which will help create effective and efficient strategies for employment development and job replacement, as well as streamline and target resources. The Secretary of Commerce and Trade will convene a CCARS conference at least once a year.

- Action Item: To better assess and take action regarding regional and state skills gaps in key occupations and industry sectors, the Virginia Employment Commission, in partnership with the Secretary of Commerce and Trade and Virginia's Workforce System, will develop an online dashboard that integrates regional and statewide information about the supply of workforce credentials, as well as information about college degrees, and other academic credentials.

Effective Date of the Executive Order

This Executive Order shall become effective upon its signing, and shall remain in full force and effect unless amended or rescinded by further executive order.

Given under my hand and under the Seal of the Commonwealth of Virginia this 13th day of August, 2014.

Terence R. McAuliffe, Governor

Attest:

Levar M. Stoney, Secretary of the Commonwealth

Appendix B: The Challenge of Counting Workforce Credentials

Virginia and the rest of the nation recognize the value of workforce credentials in providing individuals access to good-paying jobs and giving businesses the talent they need to grow and prosper. However, the nation – and Virginia is no exception – does not have robust data for credentials earned outside of the postsecondary education system or publicly regulated programs (i.e., registered apprenticeships).

Traditional federal surveys have not collected information on workforce credentials, commonly referred to as "sub-degree workforce credentials" or "alternative education credentials." In federal surveys, people with sub-degree workforce credentials currently fall into the "some college" category in the educational attainment hierarchy. For example, a community college student who takes a few courses and earns an industry certification will fall into the "some college" category, along with individuals who failed to earn any award after engaging in postsecondary education.

In addition to the absence of this information through federal surveys, the nation lacks a database of industry certifications or licenses similar to the Integrated Postsecondary Education Data System. However, licenses are collected at the state level, since state governments regulate the award of these credentials in most cases. Industry certifications, however, are not tracked easily at the national or state level. There are over 4,000 industry certification types awarded nationally that are issued by third parties, making it difficult and cost-prohibitive to access this information from the awarding organizations directly.

Examples of Workforce Credentials in Federal Surveys

Agency	Survey	Data Available (Tentative)
National Center for Education Statistics	Baccalaureate and Beyond	Summer 2015
US Census Bureau	Survey of Income and Program Participation	Winter 2015
Bureau of Labor Statistics	Current Population Survey	February 2016
National Science Foundation	National Survey of College Graduates	2016
National Center for Education Statistics	Beginning Postsecondary Students Survey	2016

Federal surveys are slowly beginning to collect this data. The Interagency Working Group on Expanded Measures of Enrollment and Attainment (GEMEnA) created a set of four questions to include on federal surveys related to licenses and industry certifications. The National Center for Education Statistics, Census Bureau, National Science Foundation, and Bureau of Labor Statistics have started or intend to incorporate items on credentialing into their surveys (see chart on page 18). Federal agencies have started to release data from these enhanced surveys, which has enabled Virginia – working with Georgetown University's Center on Education and the Workforce – to strengthen its estimate for its 10 percent 2030 goal for workforce credentials.

The lack of data on workforce credentials presents a challenge for assessment. In the absence of comprehensive federal resources on credentials, state agency data provides the best possible near-term solution for quantifying progress. Virginia's internal data sets are not without challenges, as they exclude a comprehensive count of the industry certifications, degrees, and certificates awarded by proprietary institutions. Currently, Virginia is only able to count those industry certifications earned by participants in secondary Career and Technical Education programs, as well as a few industry certifications earned by non-credit students at Virginia's Community Colleges in fiscal year 2015 (due to a pilot).

Virginia's workforce targets and goals offer a platform for enhancing our ability to collect better data on workforce credentialing. The Virginia Community College System (VCCS) is starting to implement and refine processes and procedures to collect data on industry certifications as a part of their *Complete 2021* strategic plan. A workgroup including staff from the Council on Virginia's Future, the VCCS, and the State Council of Higher Education for Virginia are additionally working on a standard industry certification to occupation crosswalk for future statewide data collection and analysis. Work continues to incorporate state registered apprenticeship and licensing data into the Virginia Longitudinal Data System (VLDS). The inclusion of these data sets into VLDS would allow the state to generate unduplicated counts for workforce credentials. For example, truck drivers can complete a registered apprenticeship or earn an postsecondary academic certificate, but they must hold a license to enter the job. Incorporating license and apprenticeship data into VLDS would allow researchers to exclude individuals with a certificate or registered apprenticeship in heavy truck driving but no license and truly account for those individuals with the workforce credential (a license) necessary for the position.

Appendix C: High-degree/Super STEM-H Occupations List

Super STEM-H occupations are those that require a high degree of STEM knowledge, offer an average wage above $34,400, and necessitate training above a high school diploma and below a bachelor's degree. Occupations with a (*) were added to the list for their importance to Virginia's workforce, but were filtered out of the education or wage criteria on the initial pass.

SOC Code	Occupation by Major Group Highlighted in Bold
130000	**Business and Financial Operations Occupations**
132021	Appraisers and Assessors of Real Estate
132082	Tax Preparers
150000	**Computer and Mathematical Occupations**
151121	Computer Systems Analysts
151134	Web Developers *
151143	Computer Network Architects *
151151	Computer User Support Specialists *
151199	Computer Occupations, All Other - Web Administrators *
170000	**Architecture and Engineering Occupations**
173012	Electrical and Electronics Drafters
173013	Mechanical Drafters
173019	Drafters, All Other
173022	Civil Engineering Technicians
173023	Electrical and Electronics Engineering Technicians
173024	Electro-Mechanical Technicians
173026	Industrial Engineering Technicians
173027	Mechanical Engineering Technicians
173029	Engineering Technicians, Except Drafters, All Other
173031	Surveying and Mapping Technicians
190000	**Life, Physical, and Social Science Occupations**
194031	Chemical Technicians

SOC Code	Occupation by Major Group Highlighted in Bold
194051	Nuclear Technicians
194093	Forest and Conservation Technicians
270000	**Arts, Design, Entertainment, Sports, and Media Occupations**
273042	Technical Writers
274012	Broadcast Technicians
274014	Sound Engineering Technicians
274031	Camera Operators, Television, Video, and Motion Picture
274099	Media and Communication Equipment Workers, All Other
290000	**Health Care Practitioners and Technical Occupations**
291141	Registered Nurses
291124	Radiation Therapists
291126	Respiratory Therapists
292012	Medical and Clinical Laboratory Technicians
292031	Cardiovascular Technologists and Technicians
292032	Diagnostic Medical Sonographers
292033	Nuclear Medicine Technologists
292034	Radiologic Technologists and Technicians
292054	Respiratory Therapy Technicians
292055	Surgical Technologists
292056	Veterinary Technologists and Technicians
310000	**Health Care Support Occupations**
312021	Physical Therapist Assistants
330000	**Protective Service Occupations**
331021	First-Line Supervisors of Fire Fighting and Prevention Workers
332011	Firefighters
332021	Fire Inspectors and Investigators
370000	**Building and Grounds Cleaning and Maintenance Occupations**

SOC Code	Occupation by Major Group Highlighted in Bold
371012	First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers
373012	Pesticide Handlers, Sprayers, and Applicators, Vegetation
390000	Personal Care and Service Occupations
394011	Embalmers
394031	Funeral Service Managers, Directors, Morticians, and Undertakers
430000	**Office and Administrative Support Occupations**
439011	Computer Operators
439031	Desktop Publishers
470000	**Construction and Extraction Occupations**
472011	Boilermakers
472031	Carpenters
472081	Drywall and Ceiling Tile Installers
472111	Electricians
472152	Plumbers, Pipefitters, and Steamfitters
472211	Sheet Metal Workers
472221	Structural Iron and Steel Workers
474021	Elevator Installers and Repairers
475031	Explosives Workers, Ordnance Handling Experts, and Blasters
490000	**Installation, Maintenance, and Repair Occupations**
491011	First-Line Supervisors of Mechanics, Installers, and Repairers
492011	Computer, Automated Teller, and Office Machine Repairers
492021	Radio, Cellular, and Tower Equipment Installers and Repairs
492022	Telecommunications Equipment Installers and Repairers, Except Line Installers
492091	Avionics Technicians
492092	Electric Motor, Power Tool, and Related Repairers
492093	Electrical and Electronics Installers and Repairers, Transportation Equipment
492094	Electrical and Electronics Repairers, Commercial and Industrial Equipment

SOC Code	Occupation by Major Group Highlighted in Bold
492095	Electrical and Electronics Repairers, Powerhouse, Substation, and Relay
492096	Electronic Equipment Installers and Repairers, Motor Vehicles
492097	Electronic Home Entertainment Equipment Installers and Repairers
493011	Aircraft Mechanics and Service Technicians
493023	Automotive Service Technicians and Mechanics
493042	Mobile Heavy Equipment Mechanics, Except Engines
493051	Motorboat Mechanics and Service Technicians
499021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers
499041	Industrial Machinery Mechanics
499043	Maintenance Workers, Machinery
499044	Millwrights
499062	Medical Equipment Repairers
499069	Precision Instrument and Equipment Repairers, All Other
499092	Commercial Divers
499099	Installation, Maintenance, and Repair Workers, All Other
510000	**Production Occupations**
511011	First-Line Supervisors of Production and Operating Workers
514012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic
514021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic
514032	Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic
514034	Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic
514035	Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic
514041	Machinists
514061	Model Makers, Metal and Plastic
514062	Patternmakers, Metal and Plastic
514111	Tool and Die Makers
514121	Welders, Cutters, Solderers, and Brazers

SOC Code	Occupation by Major Group Highlighted in Bold
515111	Prepress Technicians and Workers
517031	Model Makers, Wood
518013	Power Plant Operators
518021	Stationary Engineers and Boiler Operators
518031	Water and Wastewater Treatment Plant and System Operators
518091	Chemical Plant and System Operators
518092	Gas Plant Operators
518099	Plant and System Operators, All Other
519051	Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders
530000	**Transportation and Material Moving Occupations**
535011	Sailors and Marine Oilers
535021	Captains, Mates, and Pilots of Water Vessels
535022	Motorboat Operators
535031	Ship Engineers
537071	Gas Compressor and Gas Pumping Station Operators
537072	Pump Operators, Except Wellhead Pumpers

Appendix D: Agency Workforce Credential Survey Tool Instructions

STEM-H Credentials to Compete Data Collection

Directions

You are receiving this request, because your agency collects data that will help us measure progress towards the Governor's goal to produce 50,000 STEM-H workforce credentials during his administration.

Please fill out the information requested of your agency by using the following sheets within this workbook (see agency assignments below). You will see each sheet lists a series of occupations that were identified as having a high-degree of STEM skills in a Brookings Institute analysis. These high-STEM occupations have been filtered on the variables of wages (above an average of $34,400) and education (at least a high school diploma or equivalent and below a bachelor's degree) to narrow this list of occupations to one that reflects to the extent possible Virginia's "middle-skill" occupations.

Align the workforce credentials (industry certifications, licenses, registered apprenticeship certificates, postsecondary academic certificates to exclude post-baccalaureate certificates, and associate of applied science degrees) awarded by your agency to the occupations listed within this workbook. You can use these links (http://www.onetonline.org/crosswalk/ and http://www.careeronestop.org/toolkit/training/find-certifications.aspx) to help to guide this process. Include the related title of the workforce credential and its classification code. Additionally for industry certifications include the name of the body that issues the certification. If there is more than one workforce credential aligned to an occupation, please simply add another row (or as many needed) for the particular occupation. But please do not align a workforce credential to multiple occupations. In these cases, use your discretion in selecting the appropriate occupation to align to that particular credential. If your agency feels strongly that a workforce credential relates to an occupation on this list, but does not necessarily align, please include it on additional sheet with the requested information (related occupation, name of credential, identification code, and new awards) by year.

Using the sheets provided in this workbook, provide the number of **new awards (not graduates)** issued/awarded by your agency for the following years:

- FY2012: July 1, 2011 to June 30, 2012
- FY2013: July 1, 2012 to June 30, 2013
- FY2014: July 1, 2013 to June 30, 2014
- FY2015: July 1, 2014 to June 30, 2015

The number of awards submitted should reflect a **duplicated** count. For example, if a student earns two career studies certificates in the same year, they should be counted for each certificate they earn.

A special note on industry certifications. The industry certifications aligned to these occupations should meet the following criteria:

- Industry-recognized: Certifications shall include technical and occupational skills identified as necessary for performing functions of an occupation based on standards developed or endorsed by employers.
- Portable: Certifications shall be recognized by multiple employers, educational institutions, and across geographic areas where appropriate.
- Be Competency-based

- Third Party Validated: Certifications shall have a process for determining their validity and relevance in the workplace, and a process in place for improvement.

Agency sources for workforce credential information:

- Industry-certifications: VDOE, VCCS
- Licenses: VDHP, VDPOR, VDOT (possibly)
- Registered Apprenticeship Certificates: DOLI
- Postsecondary Academic Certificates: VCCS, SCHEV
- Associate of Applied Science Degrees: VCCS, SCHEV

Other agencies may submit data related to workforce credentials that they produce that would not be included in the data submitted by the above agencies. For example, academic certificates earned by program participants through for-profit institutions could be included.

Please include any relevant notes on the data your agency submits in a separate document.

Please **contact** Elizabeth Creamer (elizabeth.creamer@governor.virginia.gov | 804.692.2563) with questions.