State Council of Higher Education for Virginia
Gap Analysis Memo

Strategic Plan Development Project

August 1, 2014

Contents

Introduction

The State Council of Higher Education for Virginia (SCHEV) has embarked on the development of a statewide strategic plan for higher education in Virginia. SCHEV has contracted with JBL Associates (JBLA), a research firm, to assist in the process. This document is one of a number of reports prepared by JBL Associates in fulfillment of its contract to assist SCHEV.

Preparing students for the workplace is one of many important functions for Virginia's colleges[1] and universities, but identifying the skills that are most in demand by employers throughout the state is a constant challenge. As employers' needs evolve, Virginia's institutions of higher education must continually anticipate how best to prepare students for the future workplace. Many programs develop an array of skills prized by employers, such as critical thinking and communication.[2] Some majors, on the other hand, are closely tied to specific occupations. Among these closely tied programs and occupations, it becomes possible to compare the number of graduates in a given time period to the number of job openings to see how they will align.

Even with a close relationship between a job and occupation, there is less than a perfect correlation between programs of major and employment. Students with technical training may go into sales or marketing instead of directly into a technical occupation. For students graduating in general liberal arts programs, it is even more difficult to anticipate an occupation. Given these limitations, it is still helpful to identify occupational fields that are growing fast and represent a large number of new openings over the next decade. This report identifies occupational fields that will require an increasing number of employees with special training. In addition, the report anticipates the number of graduates at all levels that will have training appropriate to enter these occupations.

The approach used in this analysis provides a very broad, statewide view of the supply and demand for skilled workers in a very limited selection of programs and occupations, but it does not directly address many important aspects of the workforce preparation component of higher education. Workforce development efforts often take place at a the local level based on dialogue and partnerships between individual institutions and employers who can develop a nuanced and tailored understanding of their students' and communities' needs, an aspect of workforce preparation that is not captured at the statewide level. Furthermore, the employment market for many occupations crosses state boundaries with workers coming to Virginia and graduates of Virginia institutions finding employment in other jurisdictions, particularly in the Northern Virginia and Southside regions. Consequently, this analysis may be useful in providing statewide context for workforce development efforts. However, other tools, like institutional studies of job placement and salaries or the unemployment insurance data collected and analyzed by SCHEV, may be better suited to development of strategies and goals at the institutional level.

[1] The Virginia Higher Education Opportunity Act of 2011. http://lis.virginia.gov/cgi-bin/legp604.exe?111+ful+CHAP0828+pdf

[2] Carrier, A., Gunter, M. (2010). Weldon Cooper Center. http://www.coopercenter.org/sites/default/files/publications/Critical%20Workplace%20Skills%20for%20Virginia.pdf

Sources

The labor-market demand projections used in this analysis came from the Virginia Employment Commission (VEC), through its labor market information portal, VirginiaLMI.com.[3] These are the official employment projections for the Commonwealth and represent the most reliable comprehensive source for publicly available workforce projection data. The employment projections data set included the estimated number of workers employed in each of the occupations defined by the Standard Occupational Classification (SOC) system in 2012, the base year, and the number projected to be employed in each occupation in 2022. The data set also included the absolute change in the number of workers in each occupation, the corresponding annual growth rate and the annualized average number of new openings in each occupation due to both growth and replacement of workers leaving the occupation.

The data on the number of awards conferred at public and private, not-for-profit institutions came from SCHEV Research Reports: "C01A2: Completions, Program Detail" and "C04: Completion, Program Detail, Sector Summary Totals."[4] These reports indicated the number of certificates and degrees awarded during the 2012-13 academic year, as reported by the institutions to SCHEV. The data set included all students and all award levels at all reporting public 2-year and 4-year institutions as well as private, not-for-profit institutions. The data for the number of awards conferred at private, for-profit institutions came from the National Center for Education Statistics' (NCES) Integrated Postsecondary Educational Data System (IPEDS).[5] The awards were categorized using Classification of Instructional Programs (CIP) codes, which classify college majors by subject.

To bridge between these two sources, we used data from the "2008-2015 5-year ACS Sample" obtained from the Integrated Public Use Microdata Series (IPUMS) project.[6] The American Community Survey (ACS) is a survey conducted continuously by the Census Bureau that samples about 3 million households each year and covers topics ranging from personal demographics to employment.[7] By combining the survey responses over a five year period, the Census Bureau creates accurate estimates of population characteristics down to the census tract level. The ACS survey asks respondents to report their highest level of educational attainment and their occupation. Cross tabulating these responses produced the number of individuals who have attained each level of postsecondary award in each occupation.

Methodology and limitations

To develop the demand estimates that follow, the projected average annual new openings due to growth and replacement from the VEC was multiplied by the percentage of workers in each occupation at each education level from the ACS. This procedure gave us an estimate of the average number of workers projected to be added annually at each education level in each occupation, assuming that the mix of education attainment levels remains constant. These estimates provide a useful guide to the

[3] Virginia Employment Commission. http://www.virginialmi.com
[4] SCHEV. (2012-13). http://research.schev.edu
[5] IPEDS. (2012-13). http://nces.ed.gov/ipeds/datacenter
[6] IPUMS. (2008-2015).https://usa.ipums.org/usa/index.shtml
[7] U.S. Census Bureau. http://www.census.gov/acs/www

occupations where demand is expected to be high and give an indication of the magnitude of the demand. An aspect of this analysis that is unusual in statewide studies of workforce demand is that, in some cases, it can also give an indication of the specific level of educational attainment where that demand is concentrated. However, the estimates also have important limitations.

The ACS is a statistical survey of households, so the numbers reported at each educational level and in each occupation are statistical estimates that are subject to sampling error. The 5-year ACS estimates were used for this analysis because they provide the most stable and reliable estimates. The ACS also consists of self-reported responses, which can lead to issues of misreporting. For example, respondents are asked to select their occupation from the Census Bureau's list of occupations. However, they might misinterpret the definition of a given occupation or chose an unintended response by mistake. So, a person who works as an Engineering Technician and has an educational attainment commensurate with an Engineering Technician might report himself or herself as an Engineer, not realizing that Engineer and Engineering Technician are classified as different occupations. These results do not mean that the data are invalid, but it is important to apply contextual knowledge to the results so that they can be interpreted in a meaningful way.

It is also important to bear in mind that there may actually be many individuals working in a particular field who do not have the level of education that is usually associated with that field. They may have been grandfathered in or promoted based on on-the-job experience. In our framework, these workers are included when demand is projected based on the number of workers currently at each educational attainment level in each occupation. This may appear to indicate demand for lower levels of attainment when that is not necessarily the case. It may be that the employers would prefer to hire workers with higher levels of attainment, but that they cannot find them in the area or that, while many workers in a field today have on-the-job training, employers wish to replace them with formally trained workers in the future. For example, many high tech workers have traditionally been self-trained or have completed some college, but not earned an award. However, as the field has matured, workers with degrees and certificates in their fields have become the norm.

Another limitation of this analysis stems from the fact that the responses to the ACS are based on the Census Bureau's occupational definitions, which are then converted to SOC occupational definitions by the Census Bureau. The employment projections used in this analysis are also based on SOC occupational definitions. However, the conversion method by the Census Bureau does not always produce direct matches to the SOC codes used by the VEC in its projections. For example, the ACS data typically provided estimates for broad occupations (four-digit level, e.g. 29-106X – Physicians and Surgeons) while the employment estimates were provided for detailed occupations (six-digit level, e.g. 29-1062 – Family and General Practitioners). This occurred even when the broad occupational category contained only one detailed occupation. For this analysis, the occupational data from ACS and labor market projections were matched using the occupational definitions and crosswalks published by IPUMS.[8]

[8] IPUMS. https://usa.ipums.org/usa/volii/acs_occtooccsoc.shtml

The final step in the analysis was to compare the projected annual average new openings in select occupations to the number of awards conferred in the related programs areas. The analysis was not exhaustive of all occupations. It was limited to occupations that were projected to have 70 or more new openings per year and focused on occupations where higher education was typical. For example, Cashiers is projected to be a growing occupation, but it does not typically require any higher education and therefore was not included in the analysis. The basic methodology was to match programs to occupations that were clearly and directly related. For example, the CIP Code 22.0302 – Legal Assistant/Paralegal was matched to SOC Code 23-2011 – Paralegals and Legal Assistants. The remaining occupations of interest were then evaluated and matched using the occupational and program definitions and the CIP to SOC crosswalk published by the National Center for Education Statistics.[9] Please see Appendix A for a listing of the programs and the occupations to which they were matched.

While the Standard Occupational Classification and Classification of Instructional Programs both provide systematic categories for occupations and college majors, the SOC and CIP systems were developed separately and serve fundamentally different purposes. Whereas the program codes are divided based on their subject matter, the occupational codes are designed to describe the work people do. As a result, the systems match very well for some occupations, but they only match well enough to allow rough comparisons for others and do not match at all for many occupations.

The programs and occupations tend to align well where programs have evolved to prepare students for strong occupational licensing requirements. For example, the alignment between programs and occupations is strong in some allied health fields, such as nursing, where programs exist primarily to prepare students for the National Council Licensure Examination (NCLEX).

At the opposite end of the spectrum are occupations like sales or customer service that draw broadly on the skills associated with higher education, but are filled by graduates from such a wide variety of programs that any comparison of awards to openings is impossible. The programs and occupations cover a large number of programs that are valued by employers because they develop important workplace skills like critical thinking and communication, but because these programs and occupations cannot be unambiguously linked, they were not included in this analysis.

High tech occupations provide an example of the middle of this spectrum where the alignment is not direct, but it is strong enough to draw broad comparisons. High tech occupations have a general set of core skills and range of professional certifications served by the related academic programs. One issue in comparing awards to openings in these fields, however, is that the certification requirements are not strictly enforced in these professions, so employers are free to hire workers who have the necessary skills even if they do not have a corresponding award. Another issue is that there is often a wide variety of related programs that can lead to one of several related occupations. For example, majors in Computer Science or Information Technology can both lead to the same work as an IT Support Technician. And finally, those who earn a degree in high tech programs may find employment in the high tech sector, but not in a directly related field. This is true in high tech jobs, but also applies to

[9] http://nces.ed.gov/ipeds/cipcode/resources.aspx?y=55

programs such as law and engineering where the licensing requirements are relatively tight, but graduates often find well-paying jobs in seemingly academically unrelated occupations like finance or sales.

Programs were matched to occupations on a one-to-one basis to the greatest extent possible. This was possible for many programs in the allied health fields and for a variety of other programs, including Education at various levels, Law, Legal Assistant/Paralegal, Photography, Electrician and Heating and Air Conditioning Repair. However, for the programs and occupations in the middle of the spectrum described above, it was necessary to group several programs and occupations together in order to provide a meaningful analysis. This included the groups Accounting, Computer Technologies, Architecture and Engineering Professionals, and Corrections and Law Enforcement. That some programs and occupations are grouped and others are not was exclusively the result of the process of matching the programs to the occupations and should not be interpreted to have any other significance.

When evaluating the results of this analysis, it is important to remember that the supply amounts shown are based on the number of awards conferred in 2012. Some growth in award conferrals is already expected over the next ten years. Furthermore, the employment markets for many of the occupations included may be national in nature, especially for professional occupations like engineering. At the same time, many institutions work directly with employers in their communities and regions to fill specific workforce needs. For example, an institution may work with a local hospital to fill the need for skilled nurses or with a local manufacturer to meet demand for highly trained machinists or technicians. These are only a few examples of areas where higher education is working to meet labor market demands in geographic areas that are not well captured in this statewide analysis, but they are particularly relevant because they are widely recognized at areas of growing occupational demand. Therefore, the gaps identified should not be interpreted as predictions of over- or under-supply in the labor market, but rather as indicators of where growth in awards can best match growth in employment demand.

In light of these limitations, it is important that these data and the related findings should be considered an overview of award production in Virginia and a starting point to find areas where additional investigation may be merited, but not as a final determination of need in the workforce.

Findings

The most significant finding was that the projected annual openings in the area of Computer Technologies exceeded the current production of degrees and certificates by more than 3,100 annually. This indicated a potential gap of 31,000 potentially unfilled job openings through 2022. Based on the analysis, the number of awards conferred by public institutions in these fields could nearly double and still not keep up with the projected number of job openings. Even in consideration of the data limitations described above, this indicates room for growth in the number of awards conferred in these programs of study. Jobs in these fields, such as computer system analysts, software developers and database administrators, are among the fastest growing in the economy and generally pay well, making these programs especially good candidates to target for increased attainment.[10]

Gaps were also found in the area of accounting and in many of the allied health fields, with many of the gaps in occurring in occupations where certificates and associate's degrees are the norm. For example, the projected number of annual openings in accounting at the bachelor's level (1,215) is close to the number bachelor's degrees awarded (1,398), but the projected openings at the 1 to 2 year certificate level (499) are well above the number of certificates awarded (124), a gap of 375 openings. Other gaps included Medical Technologists (123/yr.), Dentists (71/yr.), Dental Hygienists (139/yr.), Dental Assistants (200/yr.), and even among medical doctors (133/yr.).

There were also some occupations and areas where the number of awards conferred was greater than the average annual growth expected over the projection period. After combining the award total from public, private and not-for-profit with the total from private, for-profit institutions, the number of awards in Registered Nursing programs (4,593) was higher than the projected average annual demand (1,906). This finding, in particular, is not consistent with findings at the national or local levels where nursing is widely regarded as one of the occupations most in demand. For example, VirginiaLMI.com, the VEC's portal for employment information, reports over 5,500 openings advertised online for Registered Nurses in Virginia compared to only 635 potential candidates in the state's workforce system.[11] There are several potential reasons for this difference. It is possible that employers are hiring now in anticipation of rapidly growing demand for nurses as the Baby Boom generation enters retirement or that employers are upskilling their workforces by hiring Registered Nurses with bachelor's degrees in nursing rather than associates degrees. What is clear is that the statewide supply and demand projections in this analysis does not provide the entire picture of the labor market and must be interpreted in the context of institution and program level studies that capture the local dynamics of demand for skilled nurses and healthcare workers.

The number of awards conferred also exceeded the projected demand among Architecture and Engineering Professionals by over 1,000 per year and among Lawyers by over 800 per year, but this probably does not represent a mismatch between degree production and workforce demand.

[10] CareerOneStop: Fastest Growing Occupations Virginia. http://www.careerinfonet.org/oview1.asp?next=oview1&Level=edu3&optstatus=&jobfam=&id=1&nodeid=3&soccode=&stfips=51&ShowAll=. Virginia Employment Commission.

[11] Virginia Employment Commission. Occupation Summary for Registered Nurses. www.virginialmi.com

Graduates from these academic programs may be in demand in a wide variety of careers that are related to their college major but fall into in very different occupational designations. For example, many engineering majors may find their way into sales of technical and engineered products, while law students may go to work for banks or advocacy groups. Additionally, these programs, like many others, serve a national labor market. Engineering graduates from institutions like Virginia Tech find employment throughout the country and the proximity federal government means that many graduates from Virginia's institutions may continue to live in Virginia but work in nearby Washington D.C. or Maryland. Again, placement studies performed on an institutional and program basis may provide a more accurate and reliable picture of the demand for graduates in these areas.

Finally, it should be noted that the teaching programs and occupations require special interpretation. In Virginia, the primary route to licensure for new teachers requires them to complete a bachelor's degree in an approved teacher preparation program in their area of specialization, but not in the program area of education. As a result, the education programs included in the analysis primarily show mid-career master's degrees being conferred, while the demand for teachers shown at the bachelor's level is expected to be filled by graduates of approved teacher preparation programs that are not included in the analysis.[12]

The table that follows shows the results of the analysis. The total supply of awards conferred from public institutions and private, non-profit institutions is shown, with the breakdown by program. The total supply of awards conferred from private, for-profit institutions is also shown, but is not totaled with the other institutions because they are from different sources. The breakdown by program for awards from private, for-profit institutions is shown in Appendix B.

[12] For additional information on teaching licensure requirements please see http://www.doe.virginia.gov/teaching/licensure/index.shtml, and for additional information on critical teaching shortage areas in Virginia, please see http://www.doe.virginia.gov/teaching/workforce_data/index.shtml.

Supply of degrees awarded by degree level for Public and Private, non-profit institutions, 2012-13 and overall for Private, for-profit institutions, 2011-12 (Supply) and projected annual average openings per year from 2012 to 2022, by education attainment (Demand)[1]

Program	Short Cert.[2]	Long Cert.[3]	Assoc.	Bach.	Post-bach. Cert.	First Prof.	Mast.	Doc.	Total Awards / Openings[4]
Accounting									
Accounting (52.0301)	1	7	52	1,224	33	-	561	-	1,878
Accounting and Business/Management (52.0305)	-	-	-	31	-	-	-	-	31
Accounting and Related Services, Other (52.0399)	97	63	215	-	-	-	-	-	375
Business Operations Support and Secretarial Services, Other (52.0499)	138	54	323	-	-	-	-	-	515
Supply (Public and Private, non-profit)	*236*	*124*	*590*	*1,255*	*33*	*-*	*561*	*-*	*2,799*
Supply (Private, for-profit)	*-*	*-*	*51*	*143*	*-*	*-*	*11*	*-*	*205*
Demand	*184*	*499*	*254*	*1,215*		*42*	*509*	*14*	*3,120*
Gap	**52**	**(375)**	**387**	**183**	**33**	**(42)**	**63**	**(14)**	**(116)**

Program	Short Cert.[2]	Long Cert.[3]	Assoc.	Bach.	Post-bach. Cert.	First Prof.	Mast.	Doc.	Total Awards / Openings[4]
Computer Technologies									
Computer and Information Sciences, General (11.0101)	154	44	397	565	7	-	247	62	1,476
Information Technology (11.0103)	4	2	370	309	7	-	77	8	777
Information Science/Studies (11.0401)	1	-	-	239	17	-	129	-	386
Computer Systems Analysis/Analyst (11.0501)	-	-	-	-	20	-	-	-	20
Computer Science (11.0701)	-	-	97	165	-	-	7	-	269
Computer Systems Networking and Telecommunications (11.0901)	-	-	-	-	-	-	60	-	60
Computer and Information Systems Security (11.1003)	-	-	-	-	2	-	47	-	49
Web/Multimedia Management and Webmaster (11.1004)	-	-	-	9	-	-	-	-	9
Computer/Information Technology Services Administration and Management, Other (11.1099)	-	-	-	-	2	-	-	-	2
Computer and Information Sciences and Support Services, Other (11.9999)	-	-	-	-	-	-	113	-	113
Web Page, Digital/Multimedia and Information Resources Design (11.0801)	84	1	-	-	-	-	-	-	85
Supply (Public and Private, non-profit)	*243*	*47*	*864*	*1,287*	*55*	*-*	*680*	*70*	*3,246*
Supply (Private, for-profit)	*3*	*4*	*579*	*945*	*8*	*-*	*186*	*-*	*1,725*
Demand	*251*	*973*	*643*	*3,582*		*89*	*2,070*	*113*	*8,079*
Gap	**(5)**	**(922)**	**800**	**(1,350)**	**63**	**(89)**	**(1,204)**	**(43)**	**(3,108)**

Program	Short Cert.[2]	Long Cert.[3]	Assoc.	Bach.	Post-bach. Cert.	First Prof.	Mast.	Doc.	Total Awards / Openings[4]
Architecture & Engineering Professionals									
Architecture (BArch, BA/BS, MArch, MA/MS, PhD) (04.0201)	-	-	-	190	-	-	81	5	301
Aerospace, Aeronautical and Astronautical Engineering (14.0201)	-	-	-	155	-	-	16	10	181
Civil Engineering, General (14.0801)	-	-	-	420	-	-	149	31	600
Electrical, Electronics and Communications Engineering (14.1001)	-	-	-	289	-	-	138	55	482
Environmental/Environmental Health Engineering (14.1401)	-	-	-	-	-	-	12	-	12
Industrial Engineering (14.3501)	-	-	-	127	71	-	210	17	425
Mechanical Engineering (14.1901)	-	-	-	585	-	-	60	23	668
Supply (Public and Private, non-profit)	-	-	-	*1,766*	*71*	-	*666*	*141*	*2,669*
Supply (Private, for-profit)	-	-	-	-	-	-	-	-	-
Demand	*35*	*178*	*95*	*646*		*26*	*364*	*69*	*1,501*
Gap	**(35)**	**(178)**	**(95)**	**1,120**	**71**	**(26)**	**302**	**72**	**1,168**
Electrical, Electronic and Communications Engineering Technology/Technician (15.0303)									
Supply (Public and Private, non-profit)	202	23	49	4	-	-	-	-	278
Supply (Private, for-profit)	-	-	131	22	-	-	-	-	153
Demand	17	51	30	8		1	3	-	146
Gap	**185**	**(28)**	**150**	**18**	**-**	**(1)**	**(3)**	**-**	**285**
Early Childhood Education and Teaching (13.1210)									
Supply (Public and Private, non-profit)	-	-	20	-	-	-	-	-	20
Supply (Private, for-profit)	-	-	4	-	-	-	-	-	4
Demand	17	101	43	121		1	38	-	415
Gap	**(17)**	**(101)**	**(19)**	**(121)**	**-**	**(1)**	**(38)**	**-**	**(391)**

Program	Short Cert.[2]	Long Cert.[3]	Assoc.	Bach.	Post-bach. Cert.	First Prof.	Mast.	Doc.	Total Awards / Openings[4]
Kindergarten/Preschool Education and Teaching (13.1209)									
Supply (Public and Private, non-profit)	-	-	-	26	-	-	26	-	52
Supply (Private, for-profit)	-	-	-	-	-	-	-	-	-
Demand	8	47	20	56	-	1	18	-	191
Gap	**(8)**	**(47)**	**(20)**	**(30)**	**-**	**(1)**	**8**	**-**	**(139)**
Elementary Education and Teaching (13.1202)									
Supply (Public and Private, non-profit)	-	10	-	88	6	-	430	-	534
Supply (Private, for-profit)	-	-	-	-	-	-	-	-	-
Demand	19	50	26	627	-	22	661	15	1,422
Gap	**(19)**	**(40)**	**(26)**	**(539)**	**6**	**(22)**	**(231)**	**(15)**	**(888)**
Junior High/Intermediate/Middle School Education and Teaching (13.1203)									
Supply (Public and Private, non-profit)	-	-	-	-	4	-	-	-	4
Supply (Private, for-profit)	-	-	-	-	-	-	-	-	-
Demand	9	23	12	287	-	10	303	7	652
Gap	**(9)**	**(23)**	**(12)**	**(287)**	**4**	**(10)**	**(303)**	**(7)**	**(648)**
Secondary Education and Teaching (13.1205)									
Supply (Public and Private, non-profit)	-	*2*	-	-	-	-	*182*	-	*190*
Supply (Private, for-profit)	-	-	-	-	-	-	-	-	-
Demand	*14*	*25*	*43*	*322*	-	*6*	*460*	*12*	*881*
Gap	**(14)**	**(23)**	**(43)**	**(322)**	**-**	**(6)**	**(278)**	**(12)**	**(691)**
Law (LL.B., J.D.) (22.0101)									
Supply	-	-	-	-	-	1,448	-	-	1,448
Demand	-	2	2	24		512	13	33	587
Gap	**-**	**(2)**	**(2)**	**(24)**	**-**	**936**	**(13)**	**(33)**	**861**

Program	Short Cert.[2]	Long Cert.[3]	Assoc.	Bach.	Post-bach. Cert.	First Prof.	Mast.	Doc.	Total Awards / Openings[4]
Legal Assistant/Paralegal (22.0302)									
Supply (Public and Private, non-profit)	45	44	164	32	44	-	11	-	340
Supply (Private, for-profit)	-	-	106	-	-	-	-	-	106
Demand	10	72	43	140		16	19	-	319
Gap	**35**	**(28)**	**227**	**(108)**	**44**	**(16)**	**(8)**	**-**	**127**
Graphic Design (50.0409)									
Supply (Public and Private, non-profit)	-	-	-	162	-	-	5	-	167
Supply (Private, for-profit)	-	-	43	39	-	-	-	-	82
Demand	8	33	29	132		1	24	3	264
Gap	**(8)**	**(33)**	**14**	**69**	**-**	**(1)**	**(19)**	**(3)**	**(15)**
Photography (50.0605)									
Supply (Public and Private, non-profit)	9	-	26	43	-	-	-	-	78
Supply (Private, for-profit)	-	1	-	-	-	-	-	-	1
Demand	5	11	5	27		7	9	-	84
Gap	**4**	**(10)**	**21**	**16**	**-**	**(7)**	**(9)**	**-**	**(5)**
Medicine (MD) (51.1201)									
Supply (Public and Private, non-profit)	-	-	-	-	-	459	-	-	459
Supply (Private, for-profit)	-	-	-	-	-	-	-	-	-
Demand	-	-	-	7		489	11	84	592
Gap	**-**	**-**	**-**	**(7)**	**-**	**(30)**	**(11)**	**(84)**	**(133)**
Dentistry (DDS, DMD) (51.0401)									
Supply (Public and Private, non-profit)	-	-	-	-	-	111	-	-	111
Supply (Private, for-profit)	-	-	-	-	-	-	-	-	-
Demand	-	-	-	-		117	23	34	182
Gap	**-**	**-**	**-**	**-**	**-**	**(6)**	**(23)**	**(34)**	**(71)**

Program	Short Cert.[2]	Long Cert.[3]	Assoc.	Bach.	Post-bach. Cert.	First Prof.	Mast.	Doc.	Total Awards / Openings[4]
Pharmacy (PharmD [USA] PharmD, BS/BPharm [Canada]) (51.2001)									
Supply (Public and Private, non-profit)	-	-	-	-	-	287	-	-	287
Supply (Private, for-profit)	-	-	-	-	-	-	-	-	-
Demand	-	10	8	77		67	35	67	264
Gap	**-**	**(10)**	**(8)**	**(77)**	**-**	**220**	**(35)**	**(67)**	**23**
Registered Nursing/Registered Nurse (51.3801)									
Supply (Public and Private, non-profit)	409	-	1,585	2,119	-	-	451	29	4,593
Supply (Private, for-profit)	-	101	516	38	-	-	-	-	655
Demand	29	116	621	843		49	192	12	1,906
Gap	**380**	**(15)**	**1,480**	**1,314**	**-**	**(49)**	**259**	**17**	**3,342**
Licensed Practical/Vocational Nurse Training (51.3901)									
Supply (Public and Private, non-profit)	431	363		-	-	-	-	-	794
Supply (Private, for-profit)	-	950	44	-	-	-	-	-	994
Demand	113	552	167	18		4	3	-	1,118
Gap	**318**	**761**	**(123)**	**(18)**	**-**	**(4)**	**(3)**	**-**	**670**
Nursing Practice (51.3818)									
Supply (Public and Private, non-profit)	-	-	-	-	-	-	69	8	81
Supply (Private, for-profit)	-	-	7	26	-	-	-	-	33
Demand	2	10	52	70		4	16	1	159
Gap	**(2)**	**(10)**	**(45)**	**(44)**	**-**	**(4)**	**53**	**7**	**(45)**
Nurse Anesthetist (51.3804)									
Supply (Public and Private, non-profit)	-	-	-	-	-	-	39	39	78
Supply (Private, for-profit)	-	-	-	-	-	-	-	-	-
Demand	-	9	-	-	-	10	92	-	111
Gap	**-**	**(9)**	**-**	**-**	**-**	**(10)**	**(53)**	**39**	**(33)**

Program	Short Cert.[2]	Long Cert.[3]	Assoc.	Bach.	Post-bach. Cert.	First Prof.	Mast.	Doc.	Total Awards / Openings[4]
Physician Assistant (51.0912)									
Supply (Public and Private, non-profit)	-	-	-	-	4	-	148	-	152
Supply (Private, for-profit)	-	-	-	-	-	-	-	-	-
Demand	3	24	13	33	-	9	45	-	139
Gap	**(3)**	**(24)**	**(13)**	**(33)**	**4**	**(9)**	**103**	**-**	**13**
Occupational Therapy/Therapist (51.2306)									
Supply (Public and Private, non-profit)	-	-	-	-	-	-	119	5	124
Supply (Private, for-profit)	-	-	-	-	-	-	-	-	-
Demand	-	-	13	33	-	20	48	-	115
Gap	**-**	**-**	**(13)**	**(33)**	**-**	**(20)**	**71**	**5**	**9**
Physical Therapy/Therapist (51.2308)									
Supply (Public and Private, non-profit)	-	-	-	-	-	-	-	285	285
Supply (Private, for-profit)	-	-	-	-	-	-	-	-	-
Demand	-	-	20	111		62	96	83	372
Gap	**-**	**-**	**(20)**	**(111)**	**-**	**(62)**	**(96)**	**202**	**(87)**
Veterinary Medicine (DVM) (51.2401)									
Supply (Public and Private, non-profit)	-	-	-	-	-	93	-	-	93
Supply (Private, for-profit)	-	-	-	-	-	-	-	-	-
Demand	-	-	-	-		156	-	6	162
Gap	**-**	**-**	**-**	**-**	**-**	**(63)**	**-**	**(6)**	**(69)**
Clinical Laboratory Science/Medical Technology/Technologist (51.1005)									
Supply (Public and Private, non-profit)	-	-	-	63	-	-	4	-	67
Supply (Private, for-profit)	-	-	-	-	-	-	-	-	-
Demand	12	20	43	91		-	5	3	190
Gap	**(12)**	**(20)**	**(43)**	**(28)**	**-**	**-**	**(1)**	**(3)**	**(123)**

Program	Short Cert.[2]	Long Cert.[3]	Assoc.	Bach.	Post-bach. Cert.	First Prof.	Mast.	Doc.	Total Awards / Openings[4]
Clinical/Medical Laboratory Technician (51.1004)									
Supply (Public and Private, non-profit)	165	-	43	-	-	-	-	-	208
Supply (Private, for-profit)	-	-	10	-	-	-	-	-	10
Demand	15	26	55	117		-	7	3	244
Gap	**150**	**(26)**	**(2)**	**(117)**	**-**	**-**	**(7)**	**(3)**	**(26)**
Dental Hygiene/Hygienist (51.0602)									
Supply (Public and Private, non-profit)	3	-	84	74	-	-	16	-	177
Supply (Private, for-profit)	-	-	-	-	-	-	-	-	-
Demand	-	-	213	84		-	20	-	316
Gap	**3**	**-**	**(129)**	**(10)**	**-**	**-**	**(4)**	**-**	**(139)**
Radiologic Technology/Science – Radiographer (51.0911)									
Supply (Public and Private, non-profit)	10	-	137	40	-	-	-	-	187
Supply (Private, for-profit)	14	-	52	-	-	-	-	-	66
Demand	8	22	86	28		2	2	1	165
Gap	**16**	**(22)**	**103**	**12**	**-**	**(2)**	**(2)**	**(1)**	**88**
Emergency Medical Technology/Technician (EMT Paramedic) (51.0904)									
Supply (Public and Private, non-profit)	216	-	135	16	-	-	-	-	367
Supply (Private, for-profit)	3	-	3	-	-	-	-	-	6
Demand	68	138	26	59		-	5	-	333
Gap	**151**	**(138)**	**112**	**(43)**	**-**	**-**	**(5)**	**-**	**40**
Physical Therapist Assistant (51.0806)									
Supply (Public and Private, non-profit)	-	-	99	-	-	-	-	-	99
Supply (Private, for-profit)	-	-	25	-	-	-	-	-	25
Demand	-	-	86	31		5	6	-	146
Gap	**-**	**-**	**38**	**(31)**	**-**	**(5)**	**(6)**	**-**	**(22)**

Program	Short Cert.[2]	Long Cert.[3]	Assoc.	Bach.	Post-bach. Cert.	First Prof.	Mast.	Doc.	Total Awards / Openings[4]
Massage Therapy/Therapeutic Massage (51.3501)									
Supply (Public and Private, non-profit)	48	3	-	-	-	-	-	-	51
Supply (Private, for-profit)	273	134	115	-	-	-	-	-	522
Demand	15	33	23	35		7	2	-	160
Gap	**306**	**104**	**92**	**(35)**	**-**	**(7)**	**(2)**	**-**	**413**
Dental Assisting/Assistant (51.0601)									
Supply (Public and Private, non-profit)	34	26	-	-	-	-	-	-	60
Supply (Private, for-profit)	47	87	97	-	-	-	-	-	231
Demand	39	167	62	75		27	25	-	491
Gap	**42**	**(54)**	**35**	**(75)**	**-**	**(27)**	**(25)**	**-**	**(200)**
Physician Assistant (51.0912)									
Supply (Public and Private, non-profit)	-	-	-	-	4	-	148	-	152
Supply (Private, for-profit)	-	-	-	-	-	-	-	-	-
Demand	3	24	13	33		45	9	-	139
Gap	**(3)**	**(24)**	**(13)**	**(33)**	**4**	**(45)**	**139**	**-**	**13**
Veterinary/Animal Health Technology/Technician and Veterinary Assistant (51.0808)									
Supply (Public and Private, non-profit)	2	-	71	-	-	-	-	-	73
Supply (Private, for-profit)	-	-	-	-	-	-	-	-	-
Demand	24	45	23	32		-	-	-	175
Gap	**(22)**	**(45)**	**48**	**(32)**	**-**	**-**	**-**	**-**	**(102)**
Corrections and Law Enforcement									
Corrections (43.0102)	8	7	8	-	-	-	-	-	23
Criminal Justice/Law Enforcement Administration (43.0103)	98	122	504	307	2	-	33	3	1,069
Criminal Justice/Safety Studies (43.0104)	1	-	56	713	-	-	26	-	796
Supply	*107*	*129*	*568*	*1,020*	*2*	-	*59*	*3*	*1,888*
Demand	*166*	*336*	*167*	*311*		*7*	*108*	*3*	*1,633*
Gap	**(59)**	**(207)**	**401**	**709**	**2**	**(7)**	**(49)**	**-**	**255**

Program	Short Cert.[2]	Long Cert.[3]	Assoc.	Bach.	Post-bach. Cert.	First Prof.	Mast.	Doc.	Total Awards / Openings[4]
Electrician (46.0302)									
Supply (Public and Private, non-profit)	109	53	43	-	-	-	-	-	205
Supply (Private, for-profit)	-	53	-	-	-	-	-	-	53
Demand	71	129	63	56		-	12	-	642
Gap	**38**	**(23)**	**(20)**	**(56)**	**-**	**-**	**(12)**	**-**	**(384)**
Automotive Repair									
Automobile/Automotive Mechanics Technology/Technician (47.0604)	145	51	95	-	-	-	-	-	291
Diesel Mechanics Technology/Technician (47.0605)	62	5	-	-	-	-	-	-	67
Supply (Public and Private, non-profit)	*207*	*56*	*95*	-	-	-	-	-	*358*
Supply (Private, for-profit)	-	*219*	*53*	-	-	-	-	-	*272*
Demand	*64*	129	68	43		-	7	-	825
Gap	**143**	**146**	**80**	**(43)**	**-**	**-**	**(7)**	**-**	**(195)**
Heating, Air Conditioning, Ventilation and Refrigeration Maintenance Technology/Technician (HAC, HACR, HVAC, HVACR) (47.0201)									
Supply (Public and Private, non-profit)	122	104	32	-	-	-	-	-	258
Supply (Private, for-profit)	-	121	63	-	-	-	-	-	184
Demand	46	123	43	15		-	5	5	396
Gap	**76**	**102**	**52**	**(15)**	**-**	**-**	**(5)**	**(5)**	**46**

Program	Short Cert.[2]	Long Cert.[3]	Assoc.	Bach.	Post-bach. Cert.	First Prof.	Mast.	Doc.	Total Awards / Openings[4]
Welding Technology/Welder (48.0508)									
Supply (Public and Private, non-profit)	120	51	-	-	-	-	-	-	171
Supply (Private, for-profit)	130	42	13	-	-	-	-	-	185
Demand	37	46	15	3		-	-	-	301
Gap	**213**	**47**	**(2)**	**(3)**	**-**	**-**	**-**	**-**	**55**

Notes:
1. Supply data used are the most recent available. For Public and Private, non-profit institutions data from SCHEV are for the 2012-13 academic year. For Private, for-profit institutions data from IPEDS are for 2011-12 academic year. For demand projections, values shown are the annual average of the total expected growth from 2012 to 2022 based on VEC projections.
2. Certificates of less than one year.
3. Certificates of more than one year but less than two years. For demand, this corresponds to "some college, no degree."
4. For demand only, total openings includes openings projected to be filled by workers with high school level attainment or below, which are not shown individually in the table.
See Appendix B for awards conferred by program for private, for-profit institutions.

Sources: State Council of Higher Education for Virginia (SCHEV), "Research Report C04: Completion, Program Detail, Sector Summary Totals," Academic year 2012-13, http://research.schev.edu/Completions/C_Totals_Report.asp.
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Appendix A: Programs matched to occupations

CIP code(s) and program name(s) grouped with SOC Code(s) and occupation title(s) that were used (or summed if more than one) to develop supply and projected demand by education level

CIP Code	Program Name	SOC Code	Occupation Title
	Accounting		
52.0301	Accounting	13-2011	Accountants and Auditors
52.0305	Accounting and Business/Management	43-3031	Bookkeeping, Accounting, and Auditing Clerks
52.0399	Accounting and Related Services, Other		
52.0499	Business Operations Support and Secretarial Services, Other		
	Computer Technologies		
11.0101	Computer and Information Sciences, General	15-1121	Computer Systems Analysts
11.0103	Information Technology	15-1122	Information Security Analysts
11.0401	Information Science/Studies	15-1132	Software Developers, Applications
11.0501	Computer Systems Analysis/Analyst	15-1133	Software Developers, Systems Software
11.0701	Computer Science	15-1131	Computer Programmers
11.0901	Computer Systems Networking and Telecommunications	15-1141	Database Administrators
11.1003	Computer and Information Systems Security	15-1142	Network and Computer Systems Administrators
11.1004	Web/Multimedia Management and Webmaster	15-1143	Computer Network Architects
11.1099	Computer/Information Technology Services Administration and Management, Other	15-1151	Computer User Support Specialists
11.9999	Computer and Information Sciences and Support Services, Other	15-1152	Computer Network Support Specialists
11.0801	Web Page, Digital/Multimedia and Information Resources Design	15-1134	Web Developers
	Architecture & Engineering Professionals		
04.0201	Architecture (BArch, BA/BS, MArch, MA/MS, PhD)	17-1011	Architects, Except Landscape and Naval
14.0201	Aerospace, Aeronautical and Astronautical Engineering	17-2011	Aerospace Engineers
14.0801	Civil Engineering, General	17-2051	Civil Engineers
14.1001	Electrical, Electronics and Communications Engineering	17-2071	Electrical Engineers
14.1401	Environmental/Environmental Health Engineering	17-2081	Environmental Engineers
14.3501	Industrial Engineering	17-2112	Industrial Engineers
14.1901	Mechanical Engineering	17-2141	Mechanical Engineers

CIP Code	Program Name	SOC Code	Occupation Title
15.0303	Electrical, Electronic and Communications Engineering Technology/Technician	17-3023	Electrical and Electronics Engineering Technicians
13.1210	Early Childhood Education and Teaching	25-2011	Preschool Teachers, Except Special Education
13.1209	Kindergarten/Preschool Education and Teaching	25-2012	Kindergarten Teachers, Except Special Education
13.1202	Elementary Education and Teaching	25-2021	Elementary School Teachers, Except Special Education
13.1203	Junior High/Intermediate/Middle School Education and Teaching	25-2022	Middle School Teachers, Except Special and Career/Technical
13.1205	Secondary Education and Teaching	25-2031	Secondary School Teachers, Except Special and Career/Technic
22.0101	Law (LL.B., J.D.)	23-1011	Lawyers
22.0302	Legal Assistant/Paralegal	23-2011	Paralegals and Legal Assistants
50.0409	Graphic Design	27-1024	Graphic Designers
50.0605	Photography	27-4021	Photographers
51.1201	Medicine (MD)	29-1062	Family and General Practitioners
		29-1069	Physicians and Surgeons, All Other
51.0401	Dentistry (DDS, DMD)	29-1021	Dentists, General
51.2001	Pharmacy (PharmD [USA] PharmD, BS/BPharm [Canada])	29-1051	Pharmacists
51.3801	Registered Nursing/Registered Nurse	29-1141	Registered Nurses
51.3901	Licensed Practical/Vocational Nurse Training	29-2061	Licensed Practical and Licensed Vocational Nurses
51.3818	Nursing Practice	29-1171	Nurse Practitioners
51.3804	Nurse Anesthetist	29-1151	Nurse Anesthetists
51.0912	Physician Assistant	29-1071	Physician Assistants

CIP Code	Program Name	SOC Code	Occupation Title
51.2306	Occupational Therapy/Therapist	29-1122	Occupational Therapists
51.2308	Physical Therapy/Therapist	29-1123	Physical Therapists
51.2401	Veterinary Medicine (DVM)	29-1131	Veterinarians
51.1005	Clinical Laboratory Science/Medical Technology/Technologist	29-2011	Medical and Clinical Laboratory Technologists
51.1004	Clinical/Medical Laboratory Technician	29-2012	Medical and Clinical Laboratory Technicians
51.0602	Dental Hygiene/Hygienist	29-2021	Dental Hygienists
51.0911	Radiologic Technology/Science – Radiographer	29-2034	Radiologic Technologists
51.0904	Emergency Medical Technology/Technician (EMT Paramedic)	29-2041	Emergency Medical Technicians and Paramedics
51.0806	Physical Therapist Assistant	31-2021	Physical Therapist Assistants
51.3501	Massage Therapy/Therapeutic Massage	31-9011	Massage Therapists
51.0601	Dental Assisting/Assistant	31-9091	Dental Assistants
51.0912	Physician Assistant	31-9092	Physician Assistants
51.0808	Veterinary/Animal Health Technology/Technician and Veterinary Assistant	31-9096	Veterinary Assistants and Laboratory Animal Caretakers
	Corrections and Law Enforcement		
43.0102	Corrections	33-3012	Correctional Officers and Jailers
43.0103	Criminal Justice/Law Enforcement Administration	33-3051	Police and Sheriff's Patrol Officers
43.0104	Criminal Justice/Safety Studies	33-3021	Detectives and Criminal Investigators
46.0302	Electrician	47-2111	Electricians
	Automotive Repair		
47.0604	Automobile/Automotive Mechanics Technology/Technician	49-3023	Automotive Service Technicians and Mechanics
47.0605	Diesel Mechanics Technology/Technician		

CIP Code	Program Name	SOC Code	Occupation Title
47.0201	Heating, Air Conditioning, Ventilation and Refrigeration Maintenance Technology/Technician (HAC, HACR, HVAC, HVACR)	49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and I
48.0508	Welding Technology/Welder	51-4121	Welders, Cutters, Solderers, and Brazers

Appendix B: Awards conferred by program for private, for profit institutions

Supply of degrees awarded by degree level Private, for-profit institutions, 2011-12

Program	Short Cert.[1]	Long Cert.[2]	Assoc.	Bach.	Post-bac. Cert.	First Prof.	Mast.	Doc.	Total Awards
Accounting									
Accounting (52.0301)	-	-	51	15	-	-	11	-	77
Accounting and Business/Management (52.0305)	-	-	-	128	-	-	-	-	128
Accounting and Related Services, Other (52.0399)	-	-	-	-	-	-	-	-	-
Business Operations Support and Secretarial Services, Other (52.0499)	-	-	-	-	-	-	-	-	-
Supply	-	-	51	143	-	-	11	-	205
Computer Technologies									
Computer and Information Sciences, General (11.0101)	-	-	-	8	-	-	-	-	8
Information Technology (11.0103)	-	-	108	24	-	-	77	-	209
Information Science/Studies (11.0401)	2	3	3	311	7	-	91	-	417
Computer Systems Analysis/Analyst (11.0501)	-	-	-	6	-	-	-	-	6
Computer Science (11.0701)	-	-	8	25	-	-	2	-	35
Computer Systems Networking and Telecommunications (11.0901)	-	-	391	10	1	-	16	-	418
Computer and Information Systems Security (11.1003)	-	-	13	471	-	-	-	-	484
Web/Multimedia Management and Webmaster (11.1004)	-	-	43	60	-	-	-	-	103
Computer/Information Technology Services Administration and Management, Other (11.1099)	-	-	-	19	-	-	-	-	19
Computer and Information Sciences and Support Services, Other (11.9999)	-	-	-	-	-	-	-	-	-
Web Page, Digital/Multimedia and Information Resources Design (11.0801)	1	1	13	11	-	-	-	-	26
Supply	3	4	579	945	8	-	186	-	1,725
Architecture & Engineering Professionals									

Architecture (BArch, BA/BS, MArch, MA/MS, PhD) (04.0201)	-	-	-	-	-	-	-	-	-
Aerospace, Aeronautical and Astronautical Engineering (14.0201)	-	-	-	-	-	-	-	-	-
Civil Engineering, General (14.0801)	-	-	-	-	-	-	-	-	-
Electrical, Electronics and Communications Engineering (14.1001)	-	-	-	-	-	-	-	-	-
Environmental/Environmental Health Engineering (14.1401)	-	-	-	-	-	-	-	-	-
Industrial Engineering (14.3501)	-	-	-	-	-	-	-	-	-
Mechanical Engineering (14.1901)	-	-	-	-	-	-	-	-	-
Supply	-	-	-	-	-	-	-	-	-
Electrical, Electronic and Communications Engineering Technology/Technician (15.0303)									
Supply	-	-	131	22	-	-	-	-	153
Early Childhood Education and Teaching (13.1210)									
Supply	-	-	4	-	-	-	-	-	4
Kindergarten/Preschool Education and Teaching (13.1209)	-	-	-	-	-	-	-	-	-
Elementary Education and Teaching (13.1202)	-	-	-	-	-	-	-	-	-
Supply	-	-	-	-	-	-	-	-	-
Junior High/Intermediate/Middle School Education and Teaching (13.1203)	-	-	-	-	-	-	-	-	-
Supply	-	-	-	-	-	-	-	-	-
Secondary Education and Teaching (13.1205)	-	-	-	-	-	-	-	-	-
Supply	-	-	-	-	-	-	-	-	-
Law (LL.B., J.D.) (22.0101)									
Supply	-	-	-	-	-	-	-	-	-
Legal Assistant/Paralegal (22.0302)									
Supply	-	-	106	-	-	-	-	-	106

Graphic Design (50.0409)									
Supply	-	-	43	39	-	-	-	-	82
Photography (50.0605)									
Supply	-	1	-	-	-	-	-	-	1
Demand									
Medicine (MD) (51.1201)									
Supply	-	-	-	-	-	-	-	-	-
Dentistry (DDS, DMD) (51.0401)									
Supply	-	-	-	-	-	-	-	-	-
Pharmacy (PharmD [USA] PharmD, BS/BPharm [Canada]) (51.2001)									
Supply	-	-	-	-	-	-	-	-	-
Registered Nursing/Registered Nurse (51.3801)									
Supply	-	101	516	38	-	-	-	-	655
Licensed Practical/Vocational Nurse Training (51.3901)									
Supply	-	950	44	-	-	-	-	-	994
Nursing Practice (51.3818)									
Supply	-	-	7	26	-	-	-	-	33
Nurse Anesthetist (51.3804)									
Supply	-	-	-	-	-	-	-	-	-
Physician Assistant (51.0912)									
Supply	-	-	-	-	-	-	-	-	-
Occupational Therapy/Therapist (51.2306)									
Supply	-	-	-	-	-	-	-	-	-
Physical Therapy/Therapist (51.2308)									
Supply	-	-	-	-	-	-	-	-	-
Veterinary Medicine (DVM) (51.2401)									

Supply	-	-	-	-	-	-	-	-	-
Clinical Laboratory Science/Medical Technology/Technologist (51.1005)									
Supply	-	-	-	-	-	-	-	-	-
Clinical/Medical Laboratory Technician (51.1004)									
Supply	-	-	10	-	-	-	-	-	10
Dental Hygiene/Hygienist (51.0602)									
Supply	-	-	-	-	-	-	-	-	-
Radiologic Technology/Science – Radiographer (51.0911)									
Supply	14	-	52	-	-	-	-	-	66
Emergency Medical Technology/Technician (EMT Paramedic) (51.0904)									
Supply	3	-	3	-	-	-	-	-	6
Physical Therapist Assistant (51.0806)									
Supply	-	-	25	-	-	-	-	-	25
Massage Therapy/Therapeutic Massage (51.3501)									
Supply	273	134	115	-	-	-	-	-	522
Dental Assisting/Assistant (51.0601)									
Supply	47	87	97	-	-	-	-	-	231
Physician Assistant (51.0912)									
Supply	-	-	-	-	-	-	-	-	-
Veterinary/Animal Health Technology/Technician and Veterinary Assistant (51.0808)									
Supply	-	-	-	-	-	-	-	-	-
Corrections and Law Enforcement									
Corrections (43.0102)	-	-	-	-	-	-	-	-	-

Criminal Justice/Law Enforcement Administration (43.0103)	-	-	267	177	-	-	6	-	450
Criminal Justice/Safety Studies (43.0104)	-	-	92	224	-	-	-	-	316
Supply	-	-	359	401	-	-	6	-	766
Electrician (46.0302)									
Supply	-	53	-	-	-	-	-	-	53
Automotive Repair									
Automobile/Automotive Mechanics Technology/Technician (47.0604)	-	199	53	-	-	-	-	-	252
Diesel Mechanics Technology/Technician (47.0605)	-	20	-	-	-	-	-	-	20
Supply	-	219	53	-	-	-	-	-	272
Heating, Air Conditioning, Ventilation and Refrigeration Maintenance Technology/Technician (HAC, HACR, HVAC, HVACR) (47.0201)									
Supply	-	121	63	-	-	-	-	-	184
Welding Technology/Welder (48.0508)									
Supply	130	42	13	-	-	-	-	-	185

Notes:
1 Certificates of less than one year.
2 Certificates of more than one year but less than two years.

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