Patrick Henry Community College

Central Virginia Community College

New River Community College

Review of the G3 Program's Alignment to the Virginia Labor Market

March 2023

VOEE | Virginia Office of Education Economics

Table of Contents

Executive Summary

Executive Summary

Item 213 D.2. of Chapter 2 of the 2022 Acts of Assembly, Special Session I (the 2022–24 Biennial Budget)[1] directs the Virginia Office of Education Economics (VOEE) at the Virginia Economic Development Partnership to evaluate the skills and training needed for Virginians to fill jobs available in certified regional council areas. The charge asks VOEE to look at a variety of training — high school career and technical education, credentials, certifications, apprenticeships, internships, and other degree and non-degree programs — and make recommendations to the governor and the General Assembly on what programs should qualify for financial assistance under Get Skilled, Get a Job, Give Back (G3). This report serves as that recommendation for 2022. The General Assembly gave VOEE this task as an ongoing responsibility. As a result, this report, based on analysis conducted from July to October 2022, should be viewed as a first look at the G3 program's alignment to the labor market. VOEE will update and refine the data contained here in future iterations.

The purpose of this review was to conduct a baseline evaluation to estimate the level of alignment between the 91 G3-specific fields of study identified in budget language and their associated occupations in the labor market. As part of creating that assessment, VOEE reviewed a variety of labor market metrics at both the state and regional levels to estimate how G3 programs are positioned to support projected growth in the Virginia economy. Though not exhaustive, the review presented in this study does suggest that G3 funding is strongly aligned to the middle-skilled labor market in the state and with projected growth opportunities through the end of the decade. For example:

- Associate and sub-associate award levels make up the largest portion (79%) of available programs currently eligible for G3 funding (when graduate programs are excluded).
- 85% of G3-aligned occupations require no formal work experience.
- 57% of G3-aligned occupations typically require educational attainment of an associate degree or lower.
- 91% of G3-eligible associate degrees are occupational and career-focused rather than transfer-focused.
- G3-aligned occupations show continuity between the most frequently advertised online job postings and end-of-decade projected job growth.
- The current G3 fields of study represent 32% of occupations in the Standard Occupational Classification System (SOC).
- The 255 G3-eligible occupations range across 18 SOC major groups.

All career clusters within the 17 Career Cluster framework[2] are represented in the current list of G3-aligned occupations except for the Hospitality and Tourism cluster. The career clusters containing the most G3-aligned occupations include:

1. Information technology
2. Education and training
3. Law, public safety, corrections, and security
4. Manufacturing
5. Business, management, and administration

There is a 43% (109) overlap of occupations that are aligned to both the G3 and FastForward programs.

Three quarters (75%) of G3-aligned occupations have a median wage above the MIT living wage threshold for a household of one, and about half (51%) of G3-aligned occupations offer wages above the living wage threshold for a two-earner household of four. G3-aligned occupations with the strongest wage performance across both living wage scenarios fall within the SOC major groups of management, business and financial operations, and computer and mathematical.

This report presents a selection of the metrics used to conduct the analysis of the labor market alignment of the G3 program. Users interested in further exploration can download a data set with filters based on Virginia worker concentration, median earnings, projected job change, diversity, and living wage at https://voee.org/data.

Recommendations for Consideration

It is VOEE's recommendation that no significant changes be made to the list of approved fields of study for G3 at this time. This recommendation stems from the analysis, presented here, which shows a strong general alignment of the current G3 list to the middle-skilled labor market in the Commonwealth. Additionally, at the time of this analysis, the G3 program has completed only two semesters. VOEE will be able to understand more about how G3 is being used by students when richer enrollment and outcomes data become available. It will also be essential to relate uptake and outcomes to other state programs like the Workforce Credential Grant.

One area where changes to the G3 program may be considered is in using a broader level of definition within the Classification of Instructional Programs (CIP) taxonomy to specify G3 educational program eligibility within budget language. Currently G3 relies on the six-digit level CIP to qualify program eligibility. Given the closeness of many fields of study aligning to the same occupation, converting to the four-digit series may be a more realistic way to define G3 programming while acknowledging the broader linkages between educational programs and occupations in the labor market.

In summary, the G3 funding program is an important policy initiative for the Commonwealth of Virginia. As a last-dollar financial aid assistance program, G3 exists as one of the many variations of funding assistance programs found in the United States that seek to support students' access to higher education. This report is intended to contribute to the further analysis and discussion among policy makers and educators regarding how Virginia may best invest and support this important mission for the benefit of its residents and future economic competitiveness.

VOEE Project Team

Todd Oldham, Ed.D.
Research Director

Heather McKay
Executive Director

William Richter
Research and Data Analyst

Notes

1 "(Chapter 2), Item 213 D" 2022 Special Session I, State Budget, Legislative Information System, Virginia General Assembly, Commonwealth of Virginia, https://budget.lis.virginia.gov/item/2022/2/HB30/Chapter/1/213/.

2 "SB 1405 Get Skilled, Get a Job, Give Back (G3) Fund and Program," Virginia's Legislative Information System (LIS), 2021, https://lis.virginia.gov/cgi-bin/legp604.exe?212+sum+SB1405.

Introduction

Introduction

Item 213 D.2. of Chapter 2 of the 2022 Acts of Assembly, Special Session I (the 2022-24 Biennial Budget)[1] directs the Virginia Office of Education Economics (VOEE) at the Virginia Economic Development Partnership to evaluate the skills and training needed for Virginians to fill jobs available in certified regional council areas. The charge asks VOEE to look at a variety of training — high school career and technical education (CTE), credentials, certifications, apprenticeships, internships, and other degree and non-degree programs — and make recommendations to the governor and the General Assembly on what programs should qualify for financial assistance under Get Skilled, Get a Job, Give Back (G3). This report serves as that recommendation for 2022. The General Assembly gave VOEE this task as an ongoing duty. As a result, based on analysis conducted from July to October 2022, this report should be viewed as a first look at the G3 program's alignment to the labor market. VOEE will refine this analysis over time as more data becomes available.

G3 was established in the 2021 Special Session (HB 2204/SB1405).[2] The legislation established the G3 fund and required the Virginia Community College System to establish the G3 Program. The purpose of G3 is to provide financial assistance to qualifying low-income and middle-income Virginia students "who are enrolled in an educational program at an associate-degree–granting public institution of higher education that leads to an occupation in a high-demand field." The statute contains provisions for student eligibility, financial assistance award amounts, and data reporting, which will be discussed in more depth below.

This year's review was limited in scope and scale for two reasons. First, VOEE did not have access to all the datasets required to fulfill the charge at the time of analysis. Second, because the G3 program has only been active for one year, there are few outcomes data to analyze. Although the first G3 outcomes report was released in October 2022, there was not enough time to incorporate that information into this analysis. These issues will be discussed more in the data and methods section.

Given these limitations, VOEE focused this review on a three-pronged process:
- Analyzing the current list of G3 programs approved in the budget language
- Looking at labor market demand statewide and in each of the nine GO Virginia regions
- Examining programs for possible future inclusion in G3 based on projected job change

VOEE gathered a working group to review and comment on this analysis. They provided feedback and had discussions on both the current analysis and the process for analysis in future years. They also received occasional calls and emails from working group members with comments on this analysis. Where possible, those comments have been considered. The working group included representatives from the following organizations:
- GO Virginia
- The House Appropriations Committee staff
- The Senate Finance and Appropriations Committee staff
- The Secretariat of Education
- The Secretariat of Labor

- The State Council for Higher Education in Virginia

- The Virginia Board of Workforce Development

- The Virginia Community College System

- The Virginia Department of Planning and Budget

What is G3?

The G3 program developed by the Virginia Community College System provides tuition assistance based on eligibility requirements.[3]

To receive G3 funding, a student must:

- Be a Virginia resident

- Be enrolled in an eligible G3 program

- Qualify for in-state financial aid by completing the Free Application for Federal Student Aid (FAFSA) or Financial Aid for Noncredit Training leading to Industry Credentials (FANTIC) application

- Have a total household income of less than or equal to 400% of the Federal Poverty Level

- Take a minimum of six credit hours at one of the 23 community colleges, Richard Bland College, or be enrolled in a Workforce Credential Grant program

G3 is an example of a "last-dollar assistance" program, meaning G3 will cover remaining costs after other federal or state grant aid is applied. Dollars can be used for tuition, fees, and books. Students must be enrolled in approved associate and certificate degree programs. G3 only applies to designated programs in the industries identified as in-demand when the legislation was written:

- Early childhood education

- Healthcare

- Information technology

- Manufacturing

- Public safety

- Skilled trades

The G3 budget language included a list of educational programs eligible for funding that identifies 91 fields of study using Classification of Instructional Programs (CIP) codes at the six-digit level of specificity. VOEE used this list of six-digit CIP codes as the basis for this analysis.[4] The State Board for Community Colleges later established a process for reviewing and approving G3 programs at each community college in Virginia. This list was not available at the time of analysis but will be included in future work.

Data & Methods

Data & Methods

In response to Item 213 D.2., VOEE developed a set of research questions to guide its analysis of the 91 eligible fields of study identified in the G3 budget language and its assessment of the program's alignment to the current and future labor market of Virginia.

The primary research questions guiding this analysis are as follows:

1. Do the current G3-eligible fields of study and their associated occupations align with the legislation in terms of overall requirements for employment such as required entry-level education and work experience?

2. How are G3 fields of study and their aligned occupations positioned to support current and projected demand for workers in the state and regional labor markets within Virginia?

3. What occupational families and career clusters are most represented by the current G3 fields of study list?

4. In what ways, if any, should the list of educational programs identified in the budget language as G3-eligible be revised based on this analysis?

To address the primary research questions, VOEE first conducted a review of the current state of the G3 program and its relation to the labor market to establish a baseline for further analyses aligned with the mandate. To conduct the current state review, they mapped the 91 G3 fields of study identified in the Code of Virginia to the occupations most aligned to those courses of study using a method developed by the National Center of Education Statistics (NCES) in partnership with the Bureau of Labor Statistics (BLS) called the CIP SOC Crosswalk. The NCES website describes the crosswalk this way:

> *The CIP SOC Crosswalk … matches 6-digit CIP Codes from the 2020 Classification of Instructional Programs … with 6-digit detailed descriptions from the 2018 Standard Occupational Classification (SOC). The purpose of the crosswalk is to match postsecondary programs of study that provide graduates with specific skills and knowledge to occupations requiring those skills or knowledge to be successful. The matches are based on the content of the CIP Code and SOC Code descriptions combined with expertise from statisticians at both federal agencies.[5]*

Following the mapping of the CIP SOC Crosswalk, VOEE matched labor market information at both the state and regional level for each SOC. For regional data, they followed the nine distinct GO Virginia regions as defined by the Virginia Growth and Opportunity Board. Labor market data and O*NET occupational attributes for detail-level SOC were sourced from the Lightcast 2022.3 dataset. The O*NET database,[6] collected and maintained by the Employment and Training Administration (ETA), is updated through ongoing surveys of workers in each occupation and supplemented by occupation experts. These data are incorporated into new versions of the database on an annual schedule to provide up-to-date information and characteristics on recognized occupations.

Primary government data used for the analysis but sourced from the Lightcast dataset included but were not limited to: ETA O*NET 26.3, Quarterly Census of Employment and Wages 2021 Q4, Occupational Employment and Wage Statistics (OES) 2021, BLS Employment Projections 2020–2030, Census American Community Survey 2020, and Census Quarterly Workforce Indicators 2022 Q2. SOC codes used in this analysis are limited to the 798 for which data are available for Virginia through Lightcast. Lightcast's SOC framework closely follows that of OES. (Details are available on the Emsi Knowledge Base website.[7])

VOEE analyzed G3-aligned occupations using these state- and regional-level datasets in the following ways:

- Indexed earnings to MIT Living Wage for Virginia for three household scenarios:
  - Single adult
  - One wage-earning adult and one child
  - Two wage-earning adults and two children
- Reviewed aligned jobs by typical entry-level education and required work experience
- Projected eight-year (2022–30) job growth for occupations
- Identified percentage of racial and ethnic diversity within the incumbent workforce for G3-mapped occupations
- Assessed the number and percent of career clusters represented by G3-aligned programs based on the National Career Cluster Framework (NCCF) and the Virginia Department of Education (VDOE)

To provide an assessment of how G3-aligned occupations compared to the demand for jobs in the overall labor market, VOEE utilized online job posting analytics at the state level to identify occupations showing the strongest demand measured by frequency of postings and projected job change from 2022–30.

Counts of academic programs used in the analysis included only programs from institutions reporting data to the State Higher Education Council for Virginia in the 2020–21 academic year, which include both public and private not-for-profit institutions. All program-related analysis was based on the CIP 2020 taxonomy.

As a supplement to this report, VOEE has provided an Excel spreadsheet that allows the user to filter on a variety of metrics and explore G3-eligible mapped workforce data by GO Virginia regions. It is downloadable at https://voee.org/data/.

Limitations

There are two primary limitations to the approach used to study the G3 funding program in this review:

1. G3 is a new program, and student outcomes data were not available to VOEE at the time of conducting this analysis. As this type of review is intended to become an annual process, in future years they anticipate having access to various outcomes data, including which programs are the most popular among students receiving G3 funding as well as a variety of student and graduate outcomes data related to the use of G3 funding.
2. The NCES CIP SOC Crosswalk is not based on empirical data, but as noted above, matches are made based on aligning fields of study to similar skills and knowledge that occupations have documented as required for a candidate to be successful in performing on the job. New methods based on emerging big data technologies such as computational social science show promise in testing and refining these older program-to-occupational mappings by analyzing alumni social profiles to better measure graduates' actual occupational progression in the labor market post-completion. VOEE anticipates using these methods to enhance future analyses of the G3 program and to create an empirically derived understanding of how programs link to occupations and the labor market.

Analysis of G3
Fields of Study

Analysis of G3 Fields of Study Designated in Budget Language

Budget language uses CIP codes at the 6-digit level of specificity to identify exactly 91 fields of study that qualify for G3 funding. These 91 fields correspond to 12 of the 48 academic disciplines recognized within the 2-digit series NCES CIP taxonomy. In academic year 2020–21, Virginia institutions offered 866 programs aligned with the 91 G3-eligible CIP, ranging from awards of less than one year of study to post-baccalaureate certificates. Because G3 focuses on programs that enable a graduate to gain access to entry-level occupations, graduate-level programs were excluded from the analysis. It is important to note that even though these programs are aligned in terms of belonging to the 91 CIP defined in legislation, not all of these programs may be participating in the G3 funding program. Table 1 summarizes the categorization and breakdown of these 12 academic disciplines and the count of programs eligible for G3 funding by award level and academic discipline.

Table 1

The 12 Academic Disciplines (2-digit CIP Series) Containing G3 Programs

Classification of Instructional Program (CIP)	Award/Academic Year						
	Less than one	At least one but less than two	Assoc. Degree (Occupational Technical Credit)	Assoc. Degree (Bachelor's Credit)	Four-Year Bachelor's Degree	Post-Baccalaureate Certificate	Total
Business, Management, Marketing, and Related Support Services	9	10	13	0	0	0	32
Computer And Information Sciences and Support Services	27	5	22	8	80	9	151
Construction Trades	15	6	4	0	0	0	25
Education	1	0	0	2	4	6	13
Engineering/ Engineering-Related Technologies/ Technicians	62	10	37	0	5	0	114
Family and Consumer Sciences/Human Sciences	20	10	13	0	0	0	43
Health Professions and Related Programs	112	39	84	0	33	5	273

Table 1 Continued
The 12 Academic Disciplines (2-digit CIP Series) Containing G3 Programs

	Award/Academic Year						
Classification of Instructional Program (CIP)	**Less than one**	**At least one but less than two**	**Assoc. Degree (Occupational Technical Credit)**	**Assoc. Degree (Bachelor's Credit)**	**Four-Year Bachelor's Degree**	**Post-Baccalaureate Certificate**	**Total**
Homeland Security, Law Enforcement, Firefighting and Related Protective Services	20	13	30	2	22	6	93
Mechanic and Repair Technologies/ Technicians	33	15	18	0	0	0	66
Multi/ Interdisciplinary Studies	0	0	0	9	4	0	13
Precision Production	22	16	3	0	0	0	41
Science Technologies/ Technicians	1	0	1	0	0	0	2

Figure 1 illustrates the breakdown of degree award level identified in Table 1. Evident from the analysis is the strong focus of G3 funding on programs linked to middle-skills occupations or the community college labor market.[8] Middle-skills occupations are those that require education greater than a high school diploma but less than a four-year degree and are strongly aligned to community college programming.[9] In total, 79% of programs within the current G3 academic disciplines meet the middle-skills definition being at, or below, the associate degree level and a programmatic intent that is direct to the workplace upon student completion. In contrast, only 2% of G3 qualified programs at the associate degree level are categorized as intending to transfer or lead to a bachelor's degree.

Figure 1
Academic Award Level (Excludes Graduate Programs)

- Award of less than one academic year
- At least one but less than two
- Associate Degree (Bachelor's Credit)
- Associate Degree (Occupational Technical Credit)
- Four-Year Bachelor's Degree
- Post-Baccalaureate Certificate
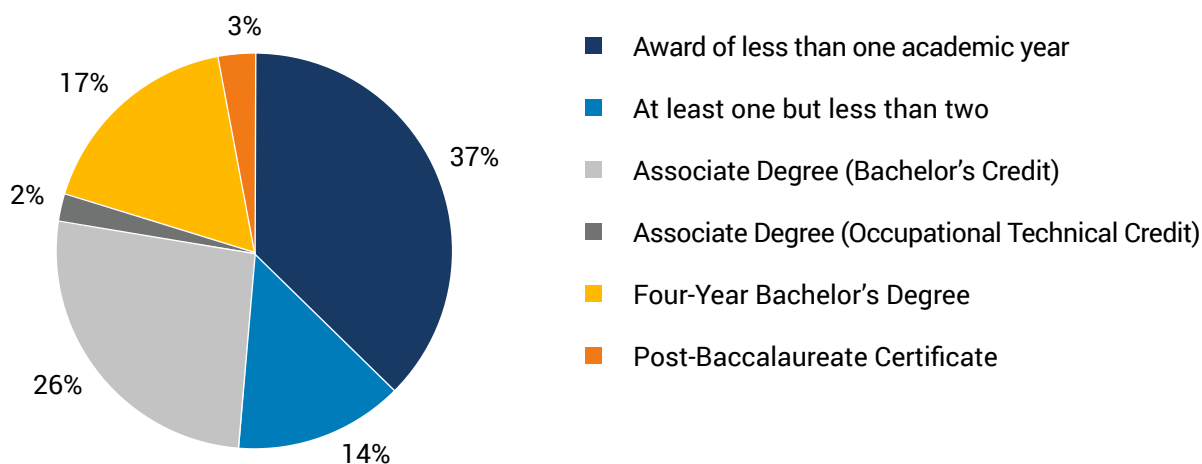
Analysis of G3 Occupations

Analysis of G3-Aligned Occupations Based on NCES CIP SOC Crosswalk

The NCES CIP SOC Crosswalk maps 91 specific fields of study identified in budget language to 255 unique occupations at the six-digit SOC level of detail. This count indicates G3-aligned occupations account for approximately 32% of all occupations within the SOC taxonomy and 74% of SOC major groups. Figure 2 shows the distribution of G3-aligned occupations among the 23 SOC major groups. The percentages at the end of each bar represent the percent of occupations in each SOC major group that are G3-aligned. The top five SOC major groups in order of highest percent of G3 occupations within them are as follows: Healthcare Support (82%); Office and Administrative Support (76%); Educational Instruction and Library (67%); Protective Service (57%); and Installation, Maintenance, and Repair (55%).

Figure 2
G3-Aligned Occupations by 2-Digit SOC Major Group and G3-aligned SOC (% of total Major Group)
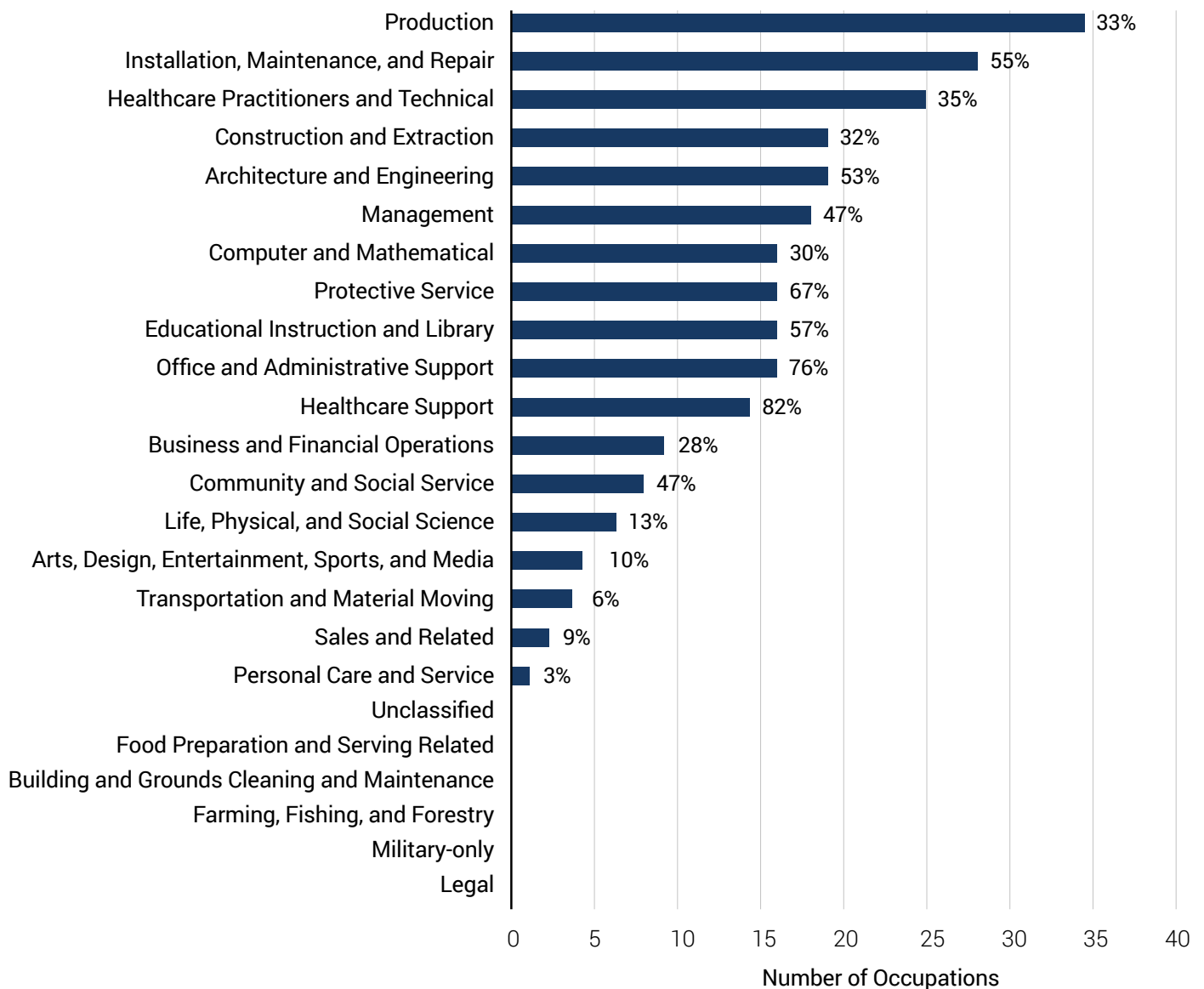
Career Cluster Representation in Current G3-Aligned Occupations

The career clusters presented in the National Career Cluster Framework (NCCF) are broad groups of careers and industries created by the U.S. Dept. of Education (DOE) to organize CTE programs. As part of its evaluation of G3 fields of study and their aligned labor market, VOEE examined how the current CIP-to-SOC mapping relates to the NCCF.[10] The 16 career clusters in the NCCF represent 79 career pathways and are intended to help learners navigate their way to greater academic and career success.[11] Virginia's Department of Education has augmented the 16 clusters in the framework with a 17th cluster defined around energy jobs. Table 2 displays the proportion of SOC representation in G3-aligned occupations relative to each of the 17 career clusters. All career clusters are represented at some level through the current list of G3-aligned occupations except the Hospitality and Tourism cluster. An individual SOC may have membership in more than one cluster. The highlighted rows represent the career clusters with the most G3-aligned occupations.

Table 2

Career Cluster Representation in G3-Aligned Occupations

Career Cluster	Total SOC in Career Cluster	G3 SOC in Career Cluster	% of G3 SOC in Career Cluster
Information Technology	20	18	90%
Law, Public Safety, Corrections, and Security	38	20	53%
Education & Training	36	19	53%
Manufacturing	133	61	46%
Business Management and Administration	62	27	44%
Agriculture, Food, and Natural Resources	41	4	10%
Architecture and Construction	88	28	32%
Arts, Audio/Video Technology and Communications	45	5	11%
Energy*	12	3	25%
Finance	25	3	12%
Government and Public Administration	19	8	42%
Health Science	93	39	42%
Hospitality and Tourism	45	0	0%
Human Services	45	10	22%
Marketing	29	5	17%
Science, Technology, Engineering, and Mathematics	49	10	20%
Transportation, Distribution, and Logistics	64	12	19%

*The Energy career cluster is a Virginia-specific addition to the 16 career clusters defined within the National Career Cluster Framework.

In Figure 3, G3-aligned occupations are categorized by the education level necessary to perform job tasks using data from the O*NET database. Over half (57%) of the occupations mapped to G3 using the CIP SOC Crosswalk report an education level no greater than an associate degree as necessary to successfully perform job tasks, revealing a strong middle-skills focus across G3-aligned fields.

Figure 3
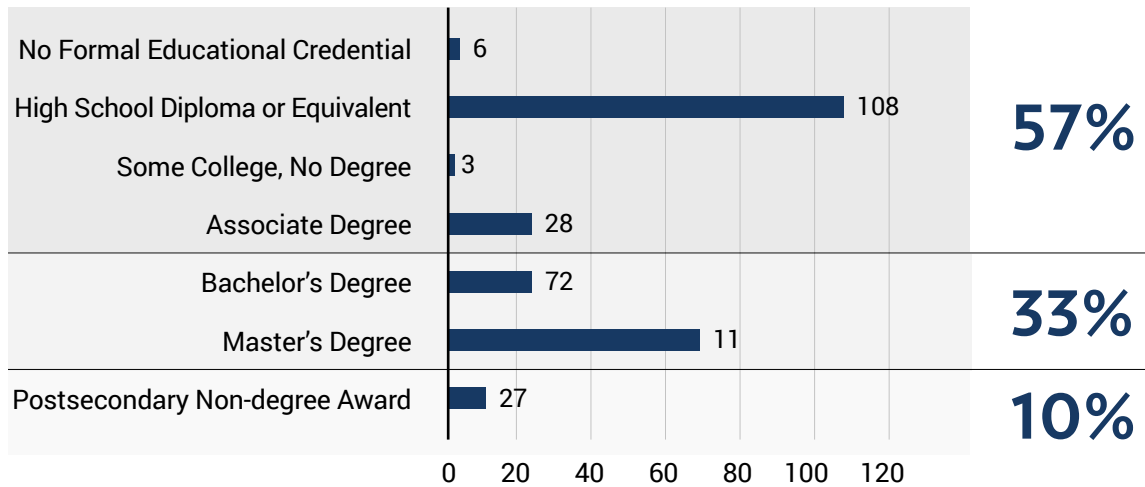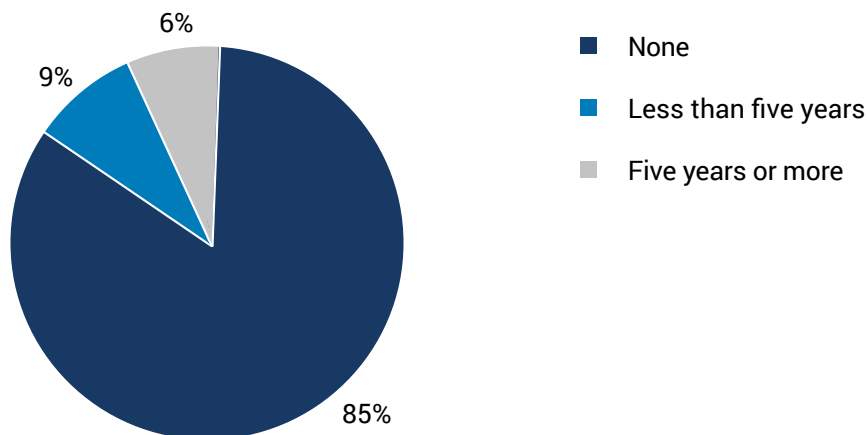G3-Aligned Occupations by Education Level as Reported to O*NET

Figure 4 shows that most occupations mapped to G3 programming report that no work experience is required for the position beyond the reported education and training.

Figure 4
Work Experience Requirements of G3-aligned Occupations as Reported to O*NET

G3 Occupational Alignment to the New Economy Workforce Credential Grant

Virginia's New Economy Workforce Credential Grant program (branded by the Virginia Community College System as FastForward) was developed during the 2016 General Assembly Session to create and sustain a supply of credentialed workers to fill high-demand occupations in fields that support the state's economy while making the attainment of these credentials more affordable.[12] VOEE compared the list of G3-aligned occupations to those designated as eligible for Workforce Credential Grants to determine how the programs align or overlap.[13] Table 3 and Figure 5 display the occupational overlap between the two funding programs by 2-digit SOC major group. Overall, 109 occupations (43% of G3-aligned occupations) are common to both the G3 and FastForward (FF) funding programs.

Table 3
G3 Occupational Alignment to the New Economy Workforce Credential Grant

| SOC Family Code	SOC Family Description	Total Occupations in SOC Family	G3-eligible Occupations	G3- and FF-eligible Occupations	% Overlap
51-0000	Production Occupations	105	35	8	23%
49-0000	Installation, Maintenance, and Repair Occupations	51	28	16	57%
29-0000	Healthcare Practitioners and Technical Occupations	71	25	16	64%
17-0000	Architecture and Engineering Occupations	36	19	9	47%
47-0000	Construction and Extraction Occupations	60	18	8	42%
11-0000	Management Occupations	38	18	0	0%
15-0000	Computer and Mathematical Occupations	21	16	14	88%
25-0000	Educational Instruction and Library Occupations	28	16	12	75%
33-0000	Protective Service Occupations	24	16	0	0%
43-0000	Office and Administrative Support Occupations	54	16	14	88%
31-0000	Healthcare Support Occupations	17	14	9	64%
13-0000	Business and Financial Operations Occupations	32	9	1	11%

Table 3

G3 Occupational Alignment to the New Economy Workforce Credential Grant

SOC Family Code	SOC Family Description	Total Occupations in SOC Family	G3-eligible Occupations	G3- and FF-eligible Occupations	% Overlap
21-0000	Community and Social Service Occupations	17	8	0	0%
19-0000	Life, Physical, and Social Science Occupations	48	6	2	33%
27-0000	Arts, Design, Entertainment, Sports, and Media Occupations	41	4	0	0%
53-0000	Transportation and Material Moving Occupations	50	3	0	0%
41-0000	Sales and Related Occupations	22	2	0	0%
39-0000	Personal Care and Service Occupations	32	1	0	0%
	Total	**798**	**255**	**109**	**43%**

Figure 5

Overlap of G3- and FastForward-aligned occupations
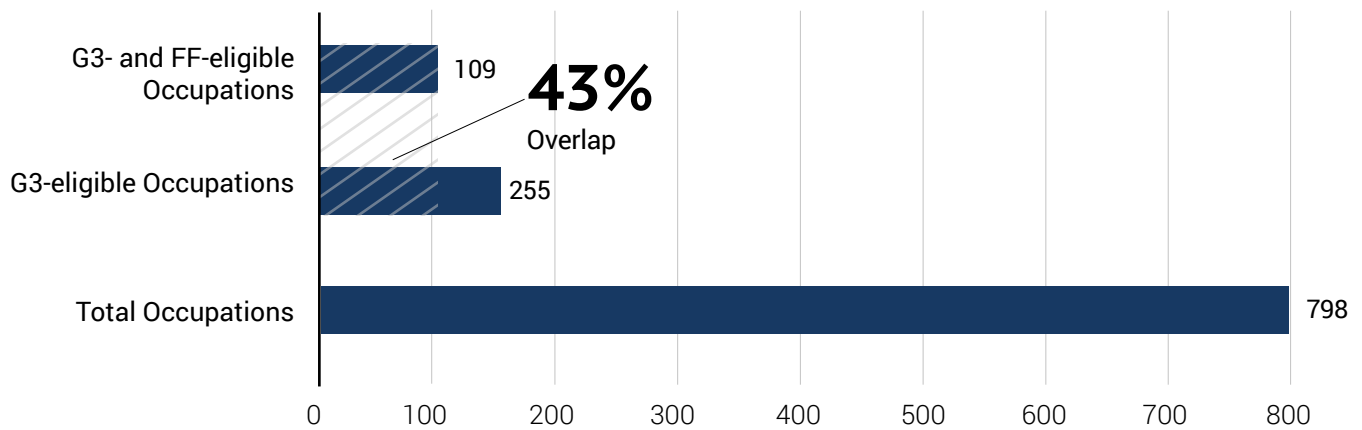
Projected Job Change for the G3 Program

As part of the analysis of how G3 fields of study support in-demand occupations, Table 4 ranks the top ten G3-aligned occupations at the six-digit SOC level of detail in Virginia based on projected job change between 2022-30. The fields of study most directly mapped to each occupation are listed in the table based on the NCES CIP SOC Crosswalk. The academic disciplines most aligned to high-growth G3 occupations include Engineering Technologies and Engineering Related Fields (CIP 15) and Healthcare Professions and Related Programs (CIP 51), followed by Computer Information Sciences and Support Services (CIP 11).

Table 4
Top Aligned SOC- & G3-Specific Fields of Study Based on Projected Job Change

Rank	SOC	SOC Name	Associated G3-eligible CIP		2022–2030 Change
1	31-1128	Home Health and Personal Care Aides	51.3902	Nursing Assistant/Aide and Patient Care Assistant/Aide	17,538
2	15-1252	Software Developers	11.0101	Computer and Information Sciences, General	11,023
			11.0103	Information Technology	
			11.0201	Computer Programming/Programmer, General	
			11.0701	Computer Science	
			51.2706	Medical Informatics	
3	11-1021	General and Operations Managers	15.0613	Manufacturing Engineering Technology/Technician	6,529
			46.0000	Construction Trades, General	
4	13-1111	Management Analysts	15.0613	Manufacturing Engineering Technology/Technician	4,653
5	29-1141	Registered Nurses	51.0999	Allied Health Diagnostic, Intervention, and Treatment Professions, Other	3,523
6	41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	15.0613	Manufacturing Engineering Technology/Technician	2,995

Table 4

Top Aligned SOC- & G3-Specific Fields of Study Based on Projected Job Change

Rank	SOC	SOC Name	Associated G3-eligible CIP		2022–2030 Change
7	15-1212	Information Security Analysts	11.0101	Computer and Information Sciences, General	2,815
			11.0103	Information Technology	
			11.0701	Computer Science	
			11.0901	Computer Systems Networking and Telecommunications	
			11.1001	Network and System Administration/Administrator	
			11.1003	Computer and Information Systems Security/Auditing/Information Assurance	
			43.0104	Criminal Justice/Safety Studies	
			43.9999	Homeland Security, Law Enforcement, Firefighting and Related Protective Services, Other	
8	39-9011	Childcare Workers	19.0709	Child Care Provider/Assistant	2,801
9	29-1171	Nurse Practitioners	51.1105	Pre-Nursing Studies	2,388
			51.3801	Registered Nursing/Registered Nurse	
			51.3899	Registered Nursing, Nursing Administration, Nursing Research and Clinical Nursing, Other	
10	49-9071	Maintenance and Repair Workers, General	15.0613	Manufacturing Engineering Technology/Technician	2,349
			46.0000	Construction Trades, General	
			47.0101	Electrical/Electronics Equipment	
			47.0105	Installation and Repair Technology/Technician, General	
			47.0603	Heating, Air Conditioning, Ventilation and Refrigeration Maintenance Technology/Technician	
			48.0508	Autobody/Collision and Repair Technology/Technician; Welding Technology/Welder	

Table 4 data is inclusive to all SOCs aligned with G3-eligible CIPs according to NCES mapping, regardless of the SOC's reported typical entry-level education.

Regional Perspectives on Aggregate Projected Job Change

VOEE compared the projected job change for G3-aligned occupations categorized by their 2-digit SOC major group across each GO Virginia region and statewide. Table 5 highlights the SOC major groups with the largest projected job growth aligned to G3-designated fields of study. The top five major occupational groups by projected job change statewide include Healthcare Support (24,886), Computer and Mathematical (21,030), Management (16,544), Healthcare Practitioners and Technical (11,526), and Business and Financial Operations (10,505).

Table 5
2022−30 Projected Job Change in Nine GO Virginia Regions and Statewide by 2-Digit SOC Major Group

2-digit SOC	SOC Family Name (Occupations)	GO Virginia Region*									Statewide
		1	2	3	4	5	6	7	8	9	
11-0000	Management	451	1,267	420	2,201	1,568	1,104	3,323	1,214	1,033	16,544
13-0000	Business and Financial Operations	211	426	135	909	490	1,040	2,146	592	659	10,505
15-0000	Computer and Mathematical	184	520	143	575	1,047	1298	8,201	592	854	21,030
17-0000	Architecture and Engineering	99	195	86	145	-159	139	-281	135	114	1,057
19-0000	Life, Physical, and Social Science	7	25	4	-64	11	10	61	10	23	121
21-0000	Community and Social Service	111	545	62	869	598	325	1,104	188	195	4,392
23-0000	Legal	0	0	0	0	0	0	0	0	0	0
25-0000	Educational Instruction and Library	105	268	-27	1,218	842	597	4,032	677	779	8,764
27-0000	Arts, Design, Entertainment, Sports, and Media	41	85	30	227	65	89	194	82	112	1,243
29-0000	Healthcare Practitioners and Technical	-30	1,294	-50	1,648	1,157	605	4,059	891	546	11,526
31-0000	Healthcare Support	563	2,074	1,055	2,631	3,440	1,310	8,437	1,350	1,536	24,886
33-0000	Protective Service	70	316	-209	120	-229	225	714	191	160	1,490
35-0000	Food Preparation and Serving Related	0	0	0	0	0	0	0	0	0	0

2-digit SOC	SOC Family Name (Occupations)	GO Virginia Region*									Statewide
		1	2	3	4	5	6	7	8	9	
37-0000	Building and Grounds Cleaning and Maintenance	0	0	0	0	0	0	0	0	0	0
39-0000	Personal Care and Service	20	183	-22	396	300	149	1,258	-8	204	2,801
41-0000	Sales and Related	110	275	134	347	125	145	587	282	232	3,612
43-0000	Office and Administrative Support	84	-482	-178	-295	-2,224	600	-1,881	262	580	2,007
45-0000	Farming, Fishing, and Forestry	0	0	0	0	0	0	0	0	0	0
47-0000	Construction and Extraction	-63	162	54	962	-508	54	1,157	104	73	3,563
49-0000	Installation, Maintenance, and Repair	214	622	249	884	-566	501	-609	648	513	4,336
51-0000	Production	434	757	251	385	-414	174	677	460	194	3,668
53-0000	Transportation and Material Moving	10	1	1	15	-8	7	23	11	0	62

Table 5 includes only the 18 SOC major groups with G3-aligned occupations. Within each SOC major group, only occupations that map to a G3-eligible program are included.

* Nine GO Virginia Regions include: Region 1, Southwest; Region 2, West Central; Region 3, Southside; Region 4, Capital Region; Region 5, Hampton Roads; Region 6, Eastern; Region 7, Northern; Region 8, Valley; Region 9, Piedmont

Labor Market Alignment of the G3 Program

Posting Intensity and Job Postings Analysis

A significant focus of this analysis was to assess how well aligned the 91 fields of study named in the G3 budget language are with the current and projected workforce needs of Virginia. To provide an assessment of how G3-aligned occupations compared to the demand for jobs in the larger labor market, VOEE accessed online job posting analytics using Lightcast Developer to retrospectively survey occupations showing the strongest measured demand by frequency of online job postings and their posting intensity from October 2021 to September 2022.

Posting intensity as defined by Lightcast is the ratio of total to unique (deduplicated) job postings for an occupation. This ratio for each individual occupation or occupational grouping can be compared to the ratio for all job postings for a given region to estimate the effort an employer or industry is making to find specific talent. Emphasis in this analysis was given to the most frequent postings aggregated to 2-digit SOC major group. Table 6 shows the 10 SOC major groups that received the most postings over the 12-month period spanning January 2021–June 2022, including the posting intensity and median posting duration. The average posting intensity for all postings statewide during this period was 3 to 1. Taken together, Tables 5 and 6 reflect a continuity between recent historic demand measured by online job ads and long-term government projections for occupations.

Table 6
Top Ten SOC Major Groups Ranked by Total and Unique Job Postings - Statewide

2-digit SOC Major Group	G3-Aligned Occupations in SOC Major Group	January 2021–June 2022 Total Postings	Unique Postings	Posting Intensity	Median Posting Duration
Computer and Mathematical	76%	435,510	191,952	2 to 1	23 days
Healthcare Practitioners and Technical	35%	423,454	168,856	3 to 1	23 days
Management	47%	403,839	155,146	3 to 1	27 days
Sales and Related	9%	446,782	122,904	4 to 1	27 days
Office and Administrative Support	30%	544,787	115,007	5 to 1	25 days
Business and Financial Operations	28%	269,222	100,480	3 to 1	26 days
Food Preparation and Serving Related	0%	228,436	68,324	3 to 1	28 days
Transportation and Material Moving	6%	312,957	67,270	5 to 1	28 days
Installation, Maintenance, and Repair	55%	129,508	46,375	3 to 1	29 days
Healthcare Support	82%	132,128	42,988	3 to 1	25 days

To estimate how the G3 program aligns to the future workforce, VOEE developed two metrics based on employment projections for Virginia through 2030. The first metric focused on analyzing projected job growth by 2-digit SOC major group for both G3-aligned and non-aligned occupations for middle-skills jobs exclusively (occupations requiring education less than a bachelor's degree but greater than a high school diploma). The exclusive focus on middle-skills occupations was employed to match the current emphasis of the G3 program on community college educational programming leading to entry-level jobs. Table 7 provides a comparison of these data. The highlighted rows indicate the 2030 middle-skills occupational categories with the highest percent of jobs aligned with a G3-eligible field of study based on projected job change.

Table 7
Projected 2030 Middle-Skills Incumbent Workforce by G3 Eligibility - Statewide

2-digit Occupational Major Group	G3-Eligible	Non G3-Eligible	2030 Jobs G3-Eligible	Non G3-Eligible
Architecture and Engineering	16,916	445	97%	3%
Arts, Design, Entertainment, Sports, and Media	0	5,082	0%	100%
Business and Financial Operations	691	0	100%	0%
Computer and Mathematical	33,143	0	100%	0%
Educational Instruction and Library	45,827	1,984	96%	4%
Food Preparation and Serving Related	0	52	0%	100%
Healthcare Practitioners and Technical	60,998	10,918	85%	15%
Healthcare Support Occupations	84,008	0	100%	0%
Installation, Maintenance, and Repair	54,994	3,892	93%	7%
Legal Occupations	0	17,149	0%	100%
Life, Physical, and Social Science	1,410	5,042	22%	78%
Management	0	304	0%	100%
Office and Administrative Support	0	48,963	0%	100%
Personal Care and Service	0	29,595	0%	100%
Production	380	1,367	22%	78%
Protective Service	14,209	0	100%	0%
Transportation and Material Moving	0	62,909	0%	100%
Total	**312,576**	**187,702**	**62%**	**38%**

The second metric to assist in assessing G3's alignment to the future projected workforce is the ranking of the percent of workers in G3-aligned occupations in each SOC major group. In this analysis, all occupations were included. Table 8 ranks these data by 2-digit SOC major group, highest to lowest percentage of G3-eligible occupations. The top occupational groups by percent of G3 eligibility include Healthcare Support (96%), Computer and Mathematical (95%), Installation, Maintenance and Repair (87%), Management (76%), Healthcare Practitioners and Technical (70%), and Construction and Extraction (70%).

Table 8
Projected 2030 Jobs Categorized by G3 Eligibility - Statewide

2-digit Occupational Major Group	Projected 2030 Jobs	G3-Eligible	Non G3-Eligible	2030 Jobs G3-Eligible	2030 Jobs Non G3-Eligible
Healthcare Support	188,628	181,097	7,531	96%	4%
Computer and Mathematical	261,621	247,434	14,187	95%	5%
Installation, Maintenance, and Repair	185,478	161,340	24,138	87%	13%
Management	293,721	224,572	69,149	76%	24%
Healthcare Practitioners and Technical	254,089	178,968	75,121	70%	30%
Construction and Extraction	207,856	145,293	62,563	70%	30%
Office and Administrative Support	485,513	322,885	162,628	67%	34%
Protective Service	112,479	70,680	41,799	63%	37%
Educational Instruction and Library	275,353	172,492	102,861	63%	37%
Community and Social Service	87,514	51,965	35,549	59%	41%
Architecture and Engineering	81,925	46,257	35,668	56%	44%
Business and Financial Operations	410,988	208,900	202,088	51%	49%
Production	185,310	73,537	111,773	40%	60%
Personal Care and Service	144,471	36,831	107,640	25%	75%
Arts, Design, Entertainment, Sports, and Media	83,758	18,179	65,579	22%	78%
Life, Physical, and Social Science	47,644	5,084	42,560	11%	89%
Sales and Related	395,950	36,957	358,993	9%	91%

2-digit Occupational Major Group	Projected 2030 Jobs	G3-Eligible	Non G3-Eligible	2030 Jobs	
				G3-Eligible	Non G3-Eligible
Transportation and Material Moving	352,933	1,234	351,699	0%	100%
Building and Grounds Cleaning and Maintenance	161,419	0	161,419	0%	100%
Farming, Fishing, and Forestry	16,260	0	16,260	0%	100%
Food Preparation and Serving Related	340,523	0	340,523	0%	100%
Legal	44,377	0	44,377	0%	100%
Total	**4,617,810**	**2,183,705**	**2,434,105**	**47%**	**53%**

Analysis of Instructional Programs Ineligible for G3 Funding

The following section assesses fields of study and their associated occupations that are not eligible for funding under G3 with the highest projected employment in 2030. Table 9 ranks instructional programs (CIP) by the number of projected jobs in 2030 in G3-aligned occupations as determined by the NCES CIP-to-SOC mapping. Occupations in the following table are restricted to middle-skills occupations (those occupations requiring an education greater than a high school diploma but less than a four-year) that are not currently aligned with any other G3-eligible CIP. Prominent instructional areas include CIP series 49-Transportation and Materials Moving, 12-Personal and Culinary Services, and 22-Legal Professions and Studies.

Table 9
Top Non-G3 Eligible Programs, by Projected Employment in Non-G3 aligned Middle-skills Occupations

Program (CIP) Title		Aligned Occupations		Projected Jobs (2030) in Aligned Occupations	Change in Aligned Jobs 2022–2030
49.0205	Truck and Bus Driver/Commercial Vehicle Operator and Instructor	53-3032	Heavy and Tractor-Trailer Truck Drivers	56,007	2,518
49.0299	Ground Transportation, Other	53-3032	Heavy and Tractor-Trailer Truck Drivers	56,007	2,518
12.0401	Cosmetology/Cosmetologist, General	39-5011	Barbers	28,677	3,477
		39-5012	Hairdressers, Hairstylists, and Cosmetologists		
		39-5091	Makeup Artists, Theatrical and Performance		
		39-5092	Manicurists and Pedicurists		
		39-5094	Skincare Specialists		

Table 9

Top Non-G3 Eligible Programs, by Projected Employment in Non-G3 aligned Middle-skills Occupations

Program (CIP) Title		Aligned Occupations		Projected Jobs (2030) in Aligned Occupations	Change in Aligned Jobs 2022–2030
12.0499	Cosmetology and Related Personal Grooming Arts, Other	39-5011	Barbers	28,677	3,477
		39-5012	Hairdressers, Hairstylists, and Cosmetologists		
		39-5091	Makeup Artists, Theatrical and Performance		
		39-5092	Manicurists and Pedicurists		
		39-5094	Skincare Specialists		
12.0413	Cosmetology, Barber/ Styling, and Nail Instructor	39-5011	Barbers	20,707	2,033
12.0407	Hair Styling/Stylist and Hair Design	39-5011	Barbers	20,707	2,033
		39-5012	Hairdressers, Hairstylists, and Cosmetologists		
22.0399	Legal Support Services, Other	23-2011	Paralegals and Legal Assistants	17,799	261
		23-2099	Legal Support Workers, All Other		
		27-3092	Court Reporters and Simultaneous Captioners		
12.0406	Make-Up Artist/ Specialist	39-5012	Hairdressers, Hairstylists, and Cosmetologists	17,767	1,612
		39-5091	Makeup Artists, Theatrical, and Performance		
12.0411	Permanent Cosmetics/Makeup and Tattooing	39-5012	Hairdressers, Hairstylists, and Cosmetologists	17,767	1,612

Because many occupations map to multiple fields of study, VOEE also considered instructional programs (CIPs) with the highest projected employment of middle-skills workers regardless of alignment to G3-eligible fields of study. In particular, numerous non-G3 fields of study from CIP series 51 (Health Professions and Related Programs) are mapped to in-demand middle-skills professions. In many cases, there are existing pathways through G3 to the occupations associated with these fields of study, although G3 does not encompass all the linkages to these occupations.

Table 10

Top Non-G3 Eligible Programs, by Projected Employment in All Middle-Skills Occupations

Program (CIP) Title		Aligned Occupations		Projected Jobs (2030) in Aligned Occupations	Change in Aligned Jobs 2022–2030
51.0899	Allied Health and Medical Assisting Services, Other	29-2031	Cardiovascular Technologists and Technicians	83,096	6,029
		29-2032	Diagnostic Medical Sonographers		
		29-2035	Magnetic Resonance Imaging Technologists		
		29-2055	Surgical Technologists		
		29-2056	Veterinary Technologists and Technicians		
		29-2072	Medical Records Specialists		
		29-2099	Health Technologists and Technicians, All Other		
		31-1131	Nursing Assistants		
		31-2011	Occupational Therapy Assistants		
		31-2021	Physical Therapist Assistants		
		31-9092	Medical Assistants		

Program (CIP) Title		Aligned Occupations		Projected Jobs (2030) in Aligned Occupations	Change in Aligned Jobs 2022–2030
51.9999	Health Professions and Related Clinical Sciences, Other	29-2036	Medical Dosimetrists	71,906	4,889
		29-2072	Medical Records Specialists		
		29-2099	Health Technologists and Technicians, All Other		
		31-1131	Nursing Assistants		
		31-9092	Medical Assistants		
		31-9097	Phlebotomists		
51.3999	Practical Nursing, Vocational Nursing and Nursing Assistants, Other	29-2061	Licensed Practical and Licensed Vocational Nurses	61,502	3,013
		31-1131	Nursing Assistants		
49.0299	Ground Transportation, Other	53-3032	Heavy and Tractor-Trailer Truck Drivers	56,007	2,518
49.0205	Truck and Bus Driver/ Commercial Vehicle Operator and Instructor	53-3032	Heavy and Tractor-Trailer Truck Drivers	56,007	2,518
51.1199	Health/Medical Preparatory Programs, Other	29-2034	Radiologic Technologists and Technicians	47,830	3,374
		29-2042	Emergency Medical Technicians		
		29-2043	Paramedics		
		29-2061	Licensed Practical and Licensed Vocational Nurses		
		31-2021	Physical Therapist Assistants		
		31-9091	Dental Assistants		
30.1101	Gerontology	29-2053	Psychiatric Technicians	43,604	1,993
		31-1131	Nursing Assistants		

Program (CIP) Title		Aligned Occupations		Projected Jobs (2030) in Aligned Occupations	Change in Aligned Jobs 2022–2030
19.0702	Adult Development and Aging	29-2053	Psychiatric Technicians;	43,604	1,993
		31-1131	Nursing Assistants		
51.0703	Health Unit Coordinator/Ward Clerk	31-1131	Nursing Assistants	41,774	1,791
		31-9094	Medical Transcriptionists		

G3-Aligned Occupations Wage Performance Indexed to Living Wage Scenarios

VOEE also analyzed how well G3-aligned occupations are able to provide a living wage. Table 11 compares 2-digit SOC major groups by the portion of G3-aligned occupations within each group that have a median income above thresholds identified by the MIT Living Wage Calculator. They based the analysis on three family scenarios: single adult earner; single parent, one child; two working adults with two children. Three occupational groups — Management, Business and Financial Operations, and Computer and Mathematical — performed well across all three living wage scenarios.

Table 11

Top Non-G3 Eligible Programs, by Projected Employment in Non-G3 Aligned Middle-skills Occupations

				Occupations with medium income above MIT Living Wage		
SOC	SOC Family	Total SOC	G3-Eligible SOC	1 Earner/ 0 Children ($19.40/hr)	2 Earners/ 2 Children ($25.55/hr)	1 Earner/ 1 Child ($36.20/hr)
11-0000	Management Occupations	38	18	100%	94%	94%
13-0000	Business and Financial Operations Occupations	32	9	100%	100%	67%
15-0000	Computer and Mathematical Occupations	21	16	100%	100%	81%
17-0000	Architecture and Engineering Occupations	36	19	100%	89%	32%
19-0000	Life, Physical, and Social Science Occupations	48	6	83%	50%	17%
21-0000	Community and Social Service Occupations	17	8	88%	25%	0%
23-0000	Legal Occupations	8	0			
25-0000	Educational Instruction and Library Occupations	28	16	81%	81%	19%
27-0000	Arts, Design, Entertainment, Sports, and Media Occupations	41	4	100%	75%	50%
29-0000	Healthcare Practitioners and Technical Occupations	71	25	88%	52%	40%

SOC	SOC Family	Total SOC	G3-Eligible SOC	Occupations with medium income above MIT Living Wage		
				1 Earner/ 0 Children ($19.40/hr)	2 Earners/ 2 Children ($25.55/hr)	1 Earner/ 1 Child ($36.20/hr)
31-0000	Healthcare Support Occupations	17	14	21%	14%	0%
33-0000	Protective Service Occupations	24	16	81%	50%	25%
35-0000	Food Preparation and Serving Related Occupations	17	0			
37-0000	Building and Grounds Cleaning and Maintenance Occupations	10	0			
39-0000	Personal Care and Service Occupations	32	1	0%	0%	0%
41-0000	Sales and Related Occupations	22	2	100%	100%	50%
43-0000	Office and Administrative Support Occupations	54	16	25%	13%	0%
45-0000	Farming, Fishing, and Forestry Occupations	14	0			
47-0000	Construction and Extraction Occupations	60	19	68%	26%	0%
49-0000	Installation, Maintenance, and Repair Occupations	51	28	86%	39%	7%
51-0000	Production Occupations	105	35	49%	20%	3%
53-0000	Transportation and Material Moving Occupations	50	3	67%	33%	33%
55-0000	Military-Only Occupations	1	0			
99-0000	Unclassified Occupation	1	0			

Summary of Findings

Summary of Findings

The purpose of this review was to conduct a baseline evaluation to estimate the level of alignment between the 91 G3-specific fields of study identified in budget language and their associated occupations in the labor market. As part of creating that assessment, VOEE reviewed a variety of labor market metrics at both the state and regional levels to estimate how G3 programs are positioned to support projected growth in the Virginia economy. Though not exhaustive, the review presented in this study does suggest that G3 funding is strongly aligned to the middle-skilled labor market in the state and with projected growth opportunities through the end of the decade. For example:

- Associate and sub-associate award levels are the largest portion (79%) of available programs currently eligible for G3 funding (when graduate programs are excluded).

- 85% of G3-aligned occupations require no formal work experience.

- 57% of G3-aligned occupations typically require educational attainment of an associate degree or lower.

- 91% of G3-eligible associate degrees (225 programs) are occupational and career focused rather than transfer focused.

- G3-aligned occupations show continuity between the most frequent recent online job postings and end-of-decade projected job growth.

The 255 occupations currently aligned with G3 range across 18 SOC major groups (74%) and comprise 32% of the occupations in the SOC system.

The following are the top five SOC major groups by projected job change statewide:
1. Healthcare Support (+24,886)
2. Computer and Mathematical (+21,030)
3. Management (+16,544)
4. Healthcare Practitioners and Technical (+11,526)
5. Business and Financial Operations (+10,505)

All career clusters within the 17 Career Cluster framework[14] are represented in the current list of G3-aligned occupations except for the Hospitality and Tourism cluster. The career clusters containing the most G3-aligned occupations include:
1. Information Technology
2. Education and Training
3. Law, Public Safety, Corrections, and Security
4. Manufacturing
5. Business, Management, and Administration

There is a 43% overlap (109 occupations) between G3-aligned occupations and those eligible for FastForward funding.

Three quarters (75%) of G3-aligned occupations have a median wage above the MIT living wage threshold for a household of one, and about half (51%) of G3-aligned occupations offer wages above the living wage threshold for a two-earner household of four. Occupational groups with strong wage performance across both living wage scenarios include management, business and financial operations, and computer and mathematical.

This report has presented a selection of the metrics used to conduct the analysis of the labor market alignment of the G3 program. Users interested in further exploration can download a data set with filters based on Virginia worker concentration, median earnings, projected job change, diversity, and living wage at https://voee.org/data.

Recommendations for Consideration

It is VOEE's recommendation that no significant changes be made to the list of approved programs for G3 at the time of this analysis. This recommendation stems from its review, which shows a strong general alignment of the current G3 list to the middle-skilled labor market in the Commonwealth. Additionally, at the time of this analysis, the G3 program has only run for two semesters. VOEE will be able to understand more about how G3 is being used by students when richer enrollment and outcomes data become available for analysis. It will also be essential to relate uptake and outcomes to other state programs like the Workforce Credential Grant.

One area where changes to the G3 program may be considered is in using a broader level of definition within the Classification of Instructional Programs (CIP) taxonomy to specify G3 educational program eligibility within budget language. Currently G3 relies on the six-digit level CIP to qualify program eligibility. Given the closeness of many fields of study aligning to the same occupation, converting to the four-digit series may be a more realistic way to define G3 programming while acknowledging the broader linkages between educational programs and occupations in the labor market.

In summary, the G3 funding program is an important policy initiative for the Commonwealth of Virginia. As a last-dollar financial aid assistance program, G3 exists as one of the many variations of funding assistance programs found in the United States that seek to support students' access to higher education. This report is intended to contribute to the further analysis and discussion among policy makers and educators regarding how Virginia may best invest and support this important mission for the benefit of its residents and future economic competitiveness.

VOEE Project Team

Todd Oldham, Ed.D.
Research Director

Heather McKay
Executive Director

William Richter
Research and Data Analyst

References

Notes

[1] "(Chapter 2), Item 231 D" 2022 Special Session I, State Budget, Legislative Information System, Virginia General Assembly, Commonwealth of Virginia, https://budget.lis.virginia.gov/item/2022/2/HB30/Chapter/1/213/.

[2] "SB 1405 Get Skilled, Get a Job, Give Back (G3) Fund and Program," Virginia's Legislative Information System (LIS), 2021, https://lis.virginia.gov/cgi-bin/legp604.exe?212+sum+SB1405.

[3] Virginia Community College System, *G3 Annual Report 2021–22*, 2022.

[4] "Budget Amendments - HB30 (Conference Report)," 2020 Session, State Budget, Legislative Information System, Virginia General Assembly, Commonwealth of Virginia, https://budget.lis.virginia.gov/amendment/2020/1/HB30/Introduced/CR/221/2c/.

[5] "The Classification of Instructional Programs," The Institute for Education Sciences, National Center for Education Statistics, 2020, https://nces.ed.gov/ipeds/cipcode/Default.aspx?y=56.

[6] "O*NET," Employment and Training Administration, United States Department of Labor, n.d., https://www.dol.gov/agencies/eta/onet.

[7] "Lightcast SOC," Emsi kb, 2022. https://kb.emsidata.com/methodology/emsi-soc/.

[8] Dixie Sommers, "National Labor Market Projections for Community College Students," *New Directions for Community Colleges 146* (Summer 2009), 33–52: https://doi.org/10.1002/cc.364.

[9] William C. Symonds, Robert Schwartz, and Ronald Ferguson, *Pathways to Prosperity: Meeting the Challenge of Preparing Young Americans for the 21st Century* (Pathways to Prosperity Project, Harvard Graduate School of Education, February 2011), https://www.gse.harvard.edu/sites/default/files/documents/Pathways_to_Prosperity_Feb2011-1.pdf.

[10] "Pathways to College and Career Readiness: Career Clusters," AdvanceCTE, n.d., https://cte.careertech.org/ites/default/files/CareerClustersPathways_0.pdf.

[11] "Career Clusters," Career Technical Education, AdvanceCTE, 2022, https://careertech.org/career-clusters.

[12] "Workforce Credential Grant," Virginia Career Works, 2018, https://virginiacareerworks.com/workforce-credential-grant/.

[13] "New Economy Workforce Credential Grant Program, Demand Fields and Related Noncredit Workforce Training Programs/Credentials," Virginia Career Works, n.d., https://virginiacareerworks.com/wp-content/uploads/HighDemandFieldsPrograms031618.pdf.

[14] "Career Clusters," Virginia Department of Education, 2022, https://www.vawizard.org/wizard/browse-by-cluster.