

2020 MIDDLE TENNESSEE  
WORKFORCE STUDY

## TABLE OF CONTENTS

<b>INTRODUCTION .....</b>	<b>3</b>
HISTORY & RATIONALE.....	4
WORKFORCE STUDY IDEATION .....	6
STUDY AREA .....	6
<b>TARGET MARKET ASSESSMENT.....</b>	<b>7</b>
INDUSTRY GROWTH ANALYSIS.....	7
INDUSTRY CLUSTER ANALYSIS.....	8
<b>OCCUPATIONAL ANALYSIS .....</b>	<b>13</b>
INDUSTRY OCCUPATION NEEDS ASSESSMENT .....	13
OCCUPATIONAL SUPPLY GAP .....	30
OCCUPATIONAL SKILLS GAP.....	31
<b>DISRUPTION &amp; AUTOMATION.....</b>	<b>32</b>
<b>TALENT PIPELINE PROGRAMS .....</b>	<b>45</b>
<b>BEST PRACTICE WORKFORCE PROFILES.....</b>	<b>45</b>
<b>STUDENT SURVEY .....</b>	<b>52</b>
<b>BARRIERS TO WORK .....</b>	<b>53</b>
<b>CONCLUSION &amp; RECCOMENDATIONS .....</b>	<b>55</b>
<b>APPENDICES .....</b>	<b>58</b>

## INTRODUCTION

*To adjust to impending structural shifts in our workforce, the U.S. will need a significant investment in, and modernization of, our active labor market policies to reflect the realities and needs of both workers and businesses. --Katie Spiker, National Skills Coalition*

While 2020 brought severe tornadoes, storms, a global pandemic, and economic downturn the year also brought to the forefront the interdependence and reliance that all economic and workforce development organizations have on one another. Despite the obstacles presented by 2020, data in this report highlights the strengths and opportunities that exist as part of the economic and labor force landscape in Middle Tennessee. By gaining a greater understanding of this data we truly begin to map out the means to ensure that every person in our region has the opportunity and support to find the right career training pathway that leads to gainful employment.

The researchers of this study are grateful to the Northern Middle Tennessee Workforce Board, for their foresight in underwriting this study. Their support was critical in the undertaking of this study of the 17-county Nashville and Clarksville Metropolitan Statistical Areas.

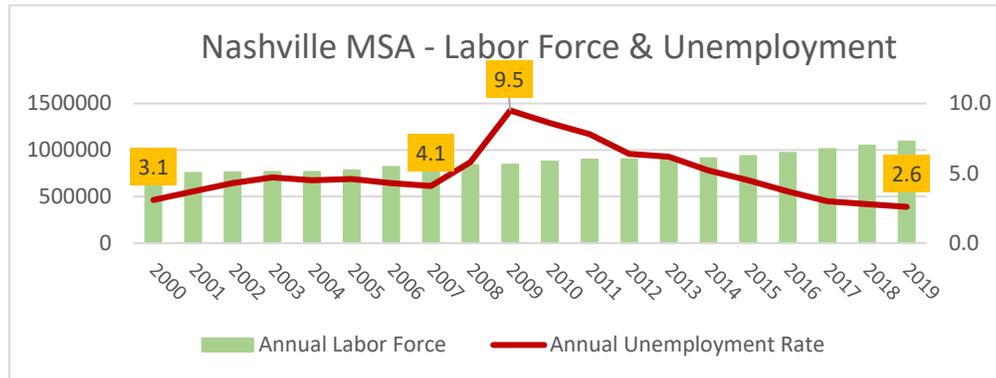
Identifying career pathways of opportunity and connecting workers across the population to training and education creates opportunity for families in Middle Tennessee to prosper. This report lays the groundwork for collaboration among policy makers, educators, talent and economic development professionals, employers, and researchers.

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## The Good

In 2007 and again in 2010, the Center for Regional Economic Competitiveness (CREC) completed studies of labor market opportunities for the Nashville area. During this period, the annual unemployment rate went from a low of 5.2% in the Clarksville Metropolitan Statistical Area (MSA) to a height of 10.3%, while the Nashville MSA reached a peak of 9.5% from a low of 4.1%.<sup>1</sup> These studies guided regional economic and workforce development efforts, as well as educational investments, for several years. In 2014, The Research Center of the Nashville Area Chamber of Commerce (Chamber) conducted an updated study that provided data and analysis of industry and occupational sectors driving the region's jobs growth and prosperity, offering insights into Nashville's demand for workforce supply and identifying skills gaps that posed challenges for future industry growth and development.

In 2019, unemployment in the Nashville MSA was trending towards historic lows, with some counties dipping below 2.0%, while the nearby Clarksville MSA hovered near 4.0%.<sup>2</sup> The economy was at full employment, (meaning no workers who are able and willing are involuntarily unemployed).



Meanwhile, the economy (as measured in terms of Gross Domestic Product [GDP]) for both regions continued to grow at a compound annual rate of 3.5% (Clarksville MSA) and 6.1% (Nashville MSA) with jobs for all industries growing at a rate of approximately 3.3% per year.<sup>3</sup> The tight labor market coupled with the extraordinary economic growth did not seem inclined to slow down and this elevated

<sup>1</sup> Bureau of Labor Statistics, Local Area Unemployment Statistics.

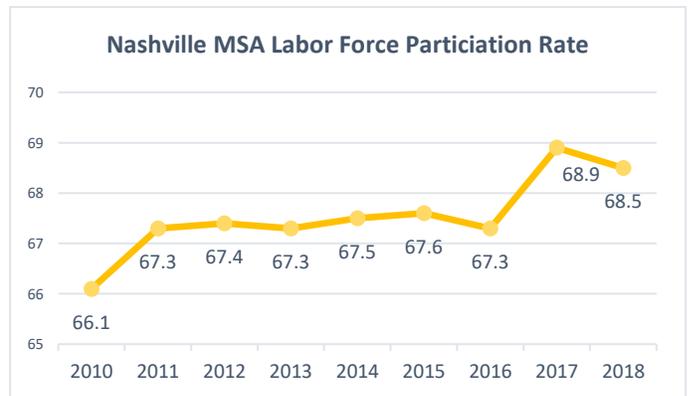
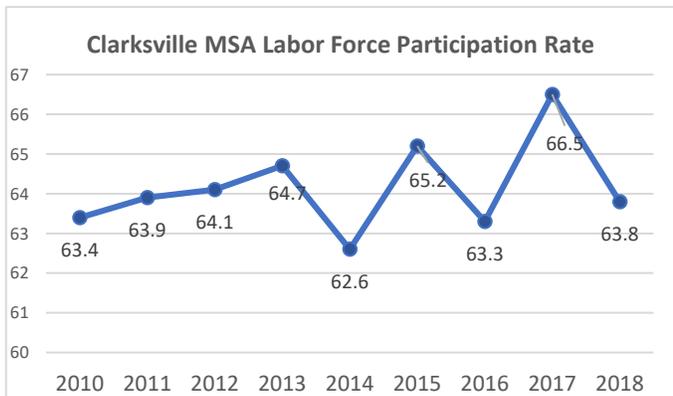
<sup>2</sup> IBID

<sup>3</sup> U.S. Bureau of Economic Analysis

workforce to the region’s top issue – driving policymakers to consider what was needed to develop the talent base, to recruit new workers to the region, and to increase workforce participation among Middle Tennesseans through training programs and other initiatives. It is also important to understand who does and does not participate in the labor force and why, to consider innovations in training outreach, recruitment practices, and private & public sector policies supporting equitable participation in prosperity.

**The Bad**

Despite notable levels of labor force growth and historically low unemployment in 2019, labor force participation rates had not returned to their pre-recessionary levels. The lackluster performance of labor force participation, begged the question, “In an economy boasting full employment, who is not fully participating and why not?” The employment participation disparities could partially be explained by diminishing civilian population trends and deficiencies in skills, but other exclusionary factors also keep some residents from fully participating in the high growth economy. **As evident by widening income disparities, lack of access to housing, healthcare, and education for some populations, macrolevel indicators of growth do not always translate into microlevel participation in prosperity.**<sup>4</sup>



**The Ugly**

The optimism and historical economic growth of the post-2010 recession in both the Nashville and Clarksville MSAs (economic region) came to an abrupt halt in early 2020 just as this study was nearing completion. As 2019 came to a close, the World Health Organization began to warn of a potential

<sup>4</sup> U.S. Bureau of Labor Analysis, Sycamore Institute TN, U.S. Census Bureau, ACS 1 yr. Estimates

outbreak of the COVID-19 virus. By early 2020, COVID-19 was a global pandemic with significant supply- and demand-side economic impacts. In mid-March, the State of Tennessee and the economic region began to feel these impacts as businesses closed normal operations and workers were temporarily furloughed or permanently laid off. By May, nearly 400,000 workers across the state were unemployed. While this number decreased slightly by the end of the month (to approximately 360,000), a surge of cases in June early summer and more than 170,000 cases statewide as of early September have tempered plans to return to pre-COVID level economic activity.<sup>5</sup>

According to the Tennessee Department of Labor and Workforce Development, our post-COVID landscape has averaged about 312,575 weekly unemployment claims for the eight-week period beginning March 22, 2020 through May 30, 2020. Despite the spike in COVID-19 cases the number of weekly unemployment claims decreased to an average of approximately 280,000 weekly unemployment claims through August 1, 2020.<sup>6</sup>

### **Workforce Study Ideation & Adaptation**

A tight labor market where both skilled and unskilled workers are in high demand is a compelling reason to undertake a workforce development study. Combine this with the unprecedented global economic quagmire created by COVID-19 and the impact on the employment landscape requires a serious assessment of the structural strengths and opportunities of our regional economy, workforce, and support infrastructure.

The Nashville Area Chamber of Commerce Research Center conducted a regional workforce study that incorporates data collection and evaluation of the Nashville and Clarksville MSAs (referred to in this report as “the economic region”). The 2020 Workforce Study addresses the following:

1. Target Market Identification: industry growth and cluster analysis
2. Occupational Assessment: identifying occupations and skills tied to regional growth clusters
3. Pipeline Asset Assessment, and a snapshot of adult students in the region
4. Barriers to Work: childcare, transportation, housing
5. The future of work: challenges and opportunities presented by Automation, AI, Disruption, & Disparity

At the onset of this work, researchers could not have foreseen the level of disruption caused by COVID-19 and the current climate of social unrest caused by disparity and systemic structural bias, racism, and discrimination on the economic and workforce landscape. The researchers have attempted to address some of these effects and will continue to update these disruption metrics as they become available to best inform the workforce development landscape.

### **The Study Area**

The Nashville-Clarksville joint metro region is a combination of the Nashville MSA’s 13-county region, as well as the Clarksville Metropolitan Statistical Area MSA’s four county region spanning both Tennessee and Kentucky. MSA’s are geographic entities with a core urban area of a population of 50,000 or more, delineated by the U.S. Office of Management and Budget (OMB). The Nashville MSA is comprised of the

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<sup>5</sup> Tennessee Department of Health

<sup>6</sup> Tennessee Department of Labor and Workforce Development, The Research Center - NACC

following thirteen counties, all in the state of Tennessee: Cannon, Cheatham, Davidson, Dickson, Maury, Macon, Robertson, Rutherford, Smith, Sumner, Trousdale, Williamson, and Wilson. The Clarksville MSA is comprised of the following four counties: Montgomery and Stewart in Tennessee, and Christian and Trigg in Kentucky. The joint-metro region is centrally located within the United States, and the state of Tennessee shares a border with eight states providing connectivity to the southeast region and beyond.<sup>7</sup>

**(MAP)**

**The Study**

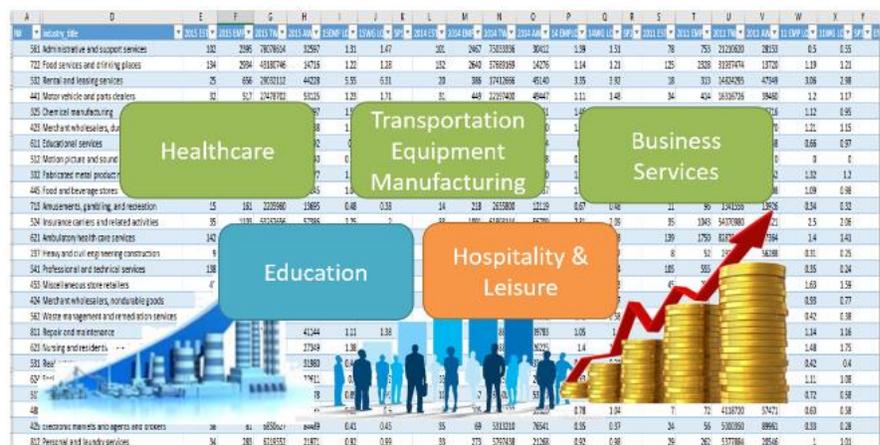
The Chamber’s Research Center (The Research Center or TRC) sought to conduct this workforce development study with a holistic and fresh approach that would provide succinct and actionable findings based on a strong body of empirical evidence. Through a comparative peer analysis, the study considers the data and trends underpinning regional industry growth tied to baseline economic and occupational strengths and identifies existing industry and workforce strengths, opportunities, and challenges. The study also introduces new data and analysis on barriers to work and how these barriers limit the full, successful participation of some demographic groups in the economic region’s prosperity.

**Industry Growth Analysis**

The first step in this process was the creation of a target market assessment for the entire economic region. This included an industry growth analysis showing growth over time in wages, employment numbers, and the number of establishments (firms) over time for each of the 17 counties that make up the economic region. This analysis used data from the Bureau of Labor Statistics and the Quarterly Census of Employment and Wages. The Bureau of Labor Statistics (BLS), provides sector-level data on industry and employment, organized using the North American Industrial Classification System (NAICS) which provides industry information tiered on a 2-, 3-, 4-, 5-, or 6-digit level with each increasing digit layering representing more detailed industry classifications. This study utilized the data on the 3-digit NAICS level, which translated to about 102 industries over eleven years for each of the 17 counties (485,520 data points). This data reveals a level of industry, employment, and wage growth to determine the high job growth and high wage growth industries.<sup>8</sup>

The industry growth analysis identified healthcare, transportation equipment manufacturing, and business services as being high growth and high wage industries, while also indicating education and the leisure and hospitality industries were also high growth areas, but not necessarily high wage industries.<sup>9</sup>

# Industry Analysis



<sup>7</sup> U.S. Department of Commerce, Office of Management and Budget

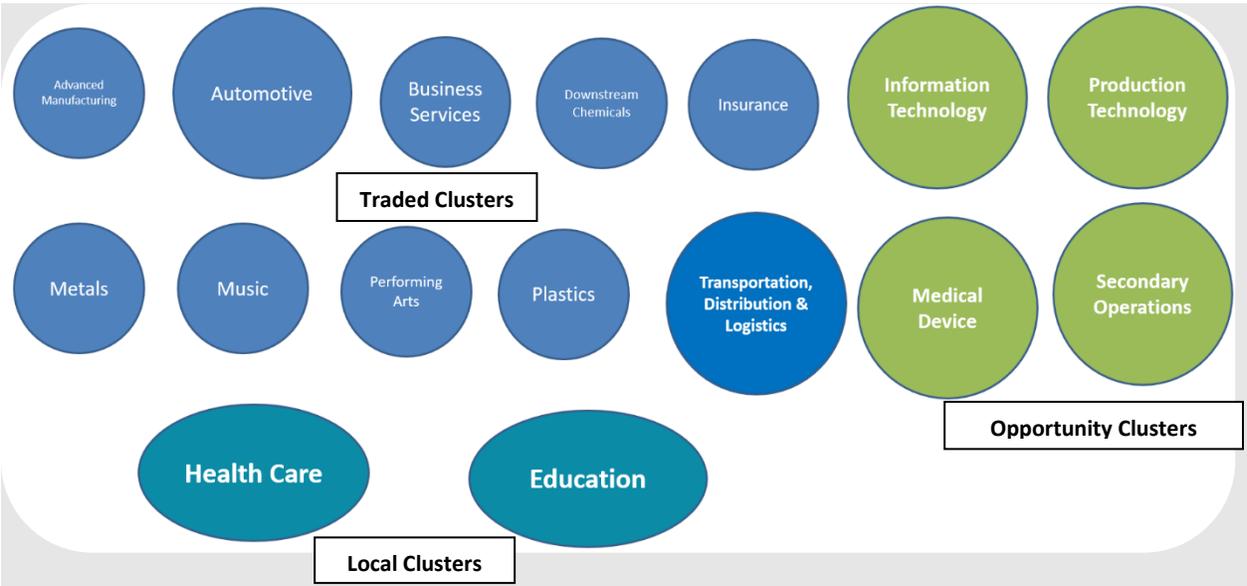
<sup>8</sup> U.S. Bureau of Labor Statistics, Quarterly Census on Employment and Wages

<sup>9</sup> IBID

**Industry Cluster Analysis**

The next step was an industry cluster analysis for the economic region to determine the collective regional strength arising from grouped industry specializations. Industry clusters are groups of related or linked businesses that function interdependently creating a competitive hub for linked industries that share common markets, occupational skills, and technologies within a given region. Typically, they do not strictly adhere to geographic boundaries such as city, county, or state lines. Clusters are important to the economic landscape because of the shared links and access to specialized suppliers, skilled workers, proximity to competitors, and base of industry knowledge. The presence of a cluster creates a geographic and localized competitive advantage over similar industries that operate in more isolated locations. The ability of economic stakeholders and policy makers to capitalize and invest in the strengthening of regional economic clusters allows for the development of high-value industries with more innovative and efficiently produced goods and services. Moreover, this type of specialized private sector grouping increases the inflow of capital or money from outside of the region. This infusion of external capital further increases a region’s economic wellbeing.

Traded and local clusters were determined by utilizing data from the US Cluster Mapping Project (the collaborative result of research from Harvard Business School, MIT Sloan, and Temple Fox School of Business), coupled with location quotient data from the TRC’s purchased third party labor market databases. Traded clusters are the industry groups (e.g., manufacturers or transportation & logistics providers) which provide goods or services beyond the geographic boundaries of the region and, as a result, bring in capital from outside the region. Traded clusters are most likely to benefit from having a strong global cooperative business climate. They typically account for about 33% of a region’s employment while providing 50% of wages and well over 90% of a region’s research and development and innovation. Local clusters are those industries (e.g., hospitals and educational institutions) that provide goods and services to a limited service geography.



Research initially identified fifteen traded clusters for the economic region. Following further data releases and updates, the clusters assessment revealed ten traded clusters, two localized clusters, and four opportunity clusters (shown above). Opportunity clusters represent those industries which do not currently exist within our economic landscape but for which we have a strong concentration of workers and suppliers.<sup>10</sup>

To demonstrate the inter-related nature of clusters and industries - automotive and advanced manufacturing are two of the largest clusters in the region, both of which caused the metals and plastics manufacturing industries to grow. These four industries have spurred the growth of the transportation, distribution & logistics industry. While downstream, chemical manufacturing has also grown in the region, the advent and increase of advanced manufacturing has spurred growth in this cluster and presents opportunities for further growth. The presence of both industrial and occupational specializations in these clusters lends itself well to create a medical device manufacturing cluster in Middle Tennessee that could rival the Memphis region. This also gives rise to opportunities for industries engaged in production technology. The complementary nature of the occupations and skills that make up these industries both in the economic region and among our peer communities allow policymakers and business leaders to consider workforce development efforts that ensure secondary operations for industries. These secondary operations would allow industries to retool or shift their operations to complementary operations that allow them to respond to market disruptions, recessions, or events such as war or global pandemics that alter or disrupt supply lines.<sup>11</sup>

The economic region also continues to perform well in business services. Davidson and Williamson Counties have seen increases in business services involving the management of companies or headquarters. Additionally, insurance and captive insurance firms (companies that manage risk for other companies or their own subsidiaries) have seen significant growth thanks in part to a strong push by the State of Tennessee to tailor a regulatory framework more conducive to the growth and recruitment of captive firms.<sup>12</sup> The increase of the local health-related cluster has also underpinned the growth in insurance related industries. Between these business clusters and the insurance industries, the opportunity exists to develop a highly specialized information technology cluster.

To determine these clusters, and map out the top occupational specializations for each, the North American Industry Classification System was utilized to align to each cluster with its respective growth sector. The table below identifies the industries having the strongest specializations in terms of industry and occupational specialization. Some clusters and industries were excluded as they represent lower regional wages<sup>13</sup>, required unskilled workers and were highly susceptible to economic disruptions. Some industries such as video production were combined into a complementary industry (i.e. the music industry).

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<sup>10</sup> U.S. Cluster Mapping, EMSI, JobsEQ, The Research Center-NACC

<sup>11</sup> IBID

<sup>12</sup> Tennessee Department of Commerce and Insurance, The Research Center - NACC

<sup>13</sup> The study considers wages in terms of the Brookings Institution discussion of Opportunity Jobs as well as MIT's wage calculator that estimates for a family of 4 (2 adults, 2 children) each adult must earn at least \$15.24 in the Nashville MSA to maintain a standard of living that provides for their basic needs. In the Clarksville MSA this amount is \$14.54.

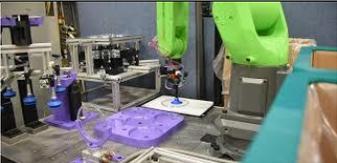
**Target Market Cluster for Nashville & Clarksville MSAs <sup>14</sup>**

Industry Cluster	Sector	NAICS
<b>Automotive</b>		
	Motor Vehicle Manufacturing	3361
	Motor Vehicle Parts Manufacturing	3363
	Foundries (Nonferrous)	3315
	Other Transportation Equipment Manufacturing	3369
	Motor Vehicle Body and Trailer Manufacturing	3362
<b>Music Industry</b>		
	Sound Recording Industries	5122
	Performing Arts Companies	7111
	Agents and Managers for Artists, Athletes, Entertainers, and other Public Figures	7114
	Independent Artists, Writers, and Performers	7115
<b>Video Production</b>		
	Motion Picture and Video Industries	5121
<b>Business Services</b>		
	Management of Companies and Enterprises	5511
	Management, Scientific and Technical Consulting Services	5416
	Accounting, Tax Preparation, Bookkeeping, and Payroll Services	5412
	Data Processing, Hosting, and related Services	5182
	Computer System Design and Related Services	5415
	Architectural, Engineering, and Related Services	5413
	Lessors of Nonfinancial Intangible Assets	5331
	Facilities Support Services	5612
	Employment Services	5613
	Legal Services	5411
	Other Support Services	5619
	Business Support Services	5614
	Other Professional, Scientific, and Technical Services	5419
	<b>Health Services*</b>	
<b>*Local Cluster with strong R&amp;D and national reach</b>		
	General Medical & Surgical Hospitals (can be traded)	6221
	Office of Physicians	6211
	Outpatient Care Centers	6214
	Medical and Diagnostic Laboratories	6215
	Offices of Dentists	6212
	Specialty Hospitals	6223
	Psychiatric and Substance Abuse Hospitals	6222
	Office of Other Health Practitioners	6213
	Nursing Care Facilities (skilled nursing)	6231
	Other Ambulatory Health Care Services	6219
	Continuing Care Retirement Communities & Assisted Living Facilities for the Elderly	6233
	Home Health Care Services	6216
	Health & Personal Care Stores	4461
	Home Health Equipment Rental	532283

<sup>14</sup>U.S. Cluster Mapping, EMSI, JobsEQ, The Research Center-NACC

	Residential Intellectual & Developmental Disability, Mental Health and Substance Abuse Facilities	6232
	Other Residential Care Facilities	6239

Industry Cluster	Sector	NAICS
<b>Education, Training &amp; Knowledge Creation</b>	<b>*Not all are traded clusters/bring in external capital trade flow</b>	
	Elementary and Secondary Schools	6111
	Community Colleges	6112
	Colleges, Universities, & Professional Schools	6113
	Business & Computer Management Training	6114
	Other Technical and Trade Schools	6115
	Educational Support Services	6117
	Research & Development	5417
<b>Federal Govt. Services</b>	<b>*Some clusters function as both traded and local clusters in terms of capital in-flow</b>	
	Federal Government, Military & Civilian	9281
	US Postal Services	4911
<b>Financial Services</b>		
	Insurance Agencies and Brokerages	5242
	Depository Credit Intermediation	5221
	Collection Agencies & Credit Bureaus	5614
	Accounting, Tax Prep, Bookkeeping and Payroll Services	5412
	Securities and Commodity Contracts Intermediation & Brokerage	5231
	Other Financial Investment Activities	5239
	Non-depository Credit Intermediation	5222
Credit Intermediation Related Activities	5223	
<b>Insurance Services</b>		
	Insurance Carriers	5241
	Agencies, Brokerages, and Other Insurance Related Activities	5242
<b>Distribution &amp; Electronic Commerce</b>		
	Warehousing and Storage	4931
	Professional/Commercial Equipment & Supplies Merchant Wholesalers	4234
	Drugs and Druggists' Sundries Merchant Wholesalers	4242
	Machinery, Equipment, and Supplies Merchant Wholesalers	4238
	Household Appliances & Electrical /Electronic Goods	4236
	Petroleum & Petroleum Products	4247
	Chemical and Allied Products	4246
	Paper & Paper Product	4241
	Beer, Wine & Distilled Alcoholic Beverage	4248
	Apparel, Piece Goods, & Notions	4243
	Metal & Mineral	4235
	Commercial and Industrial Machinery/Equip Rental & Leasing	5324
	Miscellaneous Nondurable Goods	4249
	Furniture & Home Furnishing	4232
	Wholesale Electronic Markets & Agents and Brokers	4251
	Electronic Shipping and Mail-Order Houses	4541

	All other Business Support Services	561499
	Grocery & Related Product	4244
	Misc. Durable Goods	4239
	Packaging and Labeling Services	561910
	Farm Product Raw Material	4245
<b>Industry Cluster</b>	<b>Sector</b>	<b>NAICS</b>
<b>Transportation and Logistics</b>		
	General Freight Trucking	4841
	Freight Transportation Arrangement	4885
	Nonscheduled Air Transportation	4812
	Scheduled Air Transportation	4811
	Rail Transportation	4821
	Specialized Freight Trucking	4842
	Support Activities for Air Transportation	4881
	Support Activities for Road Transportation	4884
	Support Activities for Rail Transportation	4882
	Other Support Activities for Transportation	4889
Inland Freight Transportation	4832	
<b>Industry Cluster</b>	<b>Sector</b>	<b>NAICS</b>
<b>Upstream Metals</b>		
	Nonferrous Metal (except Aluminum) Production & Processing	3314
	Alumina and Aluminum Production and Processing	3313
	Steel Product Mfg.	3312
	Forging & Stamping	3321
	Spring & Wire Product Mfg.	3326
	Agriculture, Construction, and Mining Machinery Mfg.	3311
<b>Metalworking Tech</b>	Machine Shops; Turned Product; and Screw, Nut, Bolt Mfg.	3327
	Metalworking Machinery Manufacturing	3335
	Coating, Engraving, Heat Treating, and Allied Activities	3328
<b>Downstream Metals</b>	Other Fabricated Metal Products Mfg.	3329
	Metal Window & Door Mfg.	3323
	Cutlery and Hand Tool Mfg.	3322
<b>Plastics</b>		
	Plastics Product Mfg.	3261
	Resin, Synthetic Rubber, and Artificial/Synthetic Fibers Mfg.	3252
<b>Medical Devices</b>		
	Medical Equipment and Supplies Mfg.	3391
<b>Mfg. Goods</b>	Household Appliance Mfg.	3352
<b>Downstream Chemicals</b>		
<b>Biopharma</b>	Pharmaceutical and Medicine Mfg.	3254

	Petroleum and Coal Products Mfg.	3241
	Basic Chemical Mfg.	3251
	Soap, Cleaning Compound, and Toilet Prep. Mfg.	3256
	Other Chemical Product Prep. Mfg.	3259
	Paint, Coating, and Adhesive Mfg.	3255
<b>Industry Cluster</b>	<b>Sector</b>	<b>NAICS</b>
Production Technology		
	Ventilation, Heating, Air-conditional, Commercial Ref. Equip. Mfg.	3334
	Other General-Purpose Machinery Mfg.	3339
	Commercial and Service Industry Machinery Mfg.	3333
	Fluid Power Valve and Hose Mfg.	3329
	Industrial Machinery Mfg.	3332
	Agriculture, Construction, and Mining Machinery Mfg.	3331
	Engine, Turbine, and Power Transmission Equip. Mfg.	3336
	Other general-purpose Machinery Mfg.	3399
	Navigation, Measuring, Electromedical, and Control Inst. Mfg.	3345

### **Occupational Needs Assessment**

From these clusters, the study determined the top five occupations per major employment and wage growth cluster for which the economic region has high employment (occupational) specialization or a location quotient (LQ) above 1.0. Regional specializations refer to the concentration of workers with a given occupational skill indexed to the national average. This determines the location quotient for that geography compared to similar geographics (county to county, MSA to MSA, city to city). A location quotient of 1.0 represents the national average, with numbers above 1.0 representing higher than average concentrations and numbers below 1.0 representing lower than average concentrations.

The study also identified if the target cluster had occupations for which the economic region has low specialization (LQ below 1.0). Since industries are dependent on these key occupations, those with a low concentration (LQ) of skilled workers present the logical area of focus for the creation or promotion of workforce development programs to increase the pipeline of skilled workers to those target occupations. These recommendations are tempered against 5-year and 10-year occupational gaps analysis.<sup>15</sup> The study includes an occupational analysis report for each of the selected subset of occupations in order to assess supply and demand, demographic composition, and the makeup of these occupations by level of training required and the training pipeline. Each of these occupations received an automation value that will allow us to assess their potential risk of technological disruption, as well as the opportunities present to upskill to meet future technological needs. A COVID-19 risk index which indicates the level of vulnerability of occupations resulting from COVID-19 impacts on industries will also be integrated into the occupational matrix as well.

The study next layers in wage data to determine whether the occupation provides a “Good,” “Promising,” or “Other” job using the Brookings Institute’s methodology on Opportunity Jobs. The economic region’s target sectors are a source of “good” and “promising” jobs. Good jobs, as defined by

<sup>15</sup> Due to COVID-19 and its drastic alteration of our workforce landscape, we weighted 3-year and 5-year gaps against sector level unemployment as part of our selection process

the Brookings Institution, offer “stable employment, middle-class wages and benefits” for workers without a bachelor’s degree. Promising jobs are entry-level positions for workers without a bachelor’s degree “from which most workers can reach a good job within 10 years.”<sup>16</sup> High-skill jobs are good or promising jobs for workers with a bachelor’s degree. All other jobs that do not fit these categories are classified as “other jobs” by the Brookings Institution.<sup>17</sup> A good or promising job typically pays above the regional median wage, which in the Clarksville MSA is \$16.11 and \$18.37 for the Nashville MSA. For the combined economic region, the median wage is \$18.27. According to

In Middle Tennessee, certificate and degree-requiring occupations which fall into the “good” and “promising” jobs category are also the least vulnerable to the impact of COVID-19.<sup>18</sup> These include professional and technical jobs associated with corporate operations, information technology, community services and health care. The occupations requiring the lowest level of training and education and are least likely to fall into the “good” or “promising” job category are also the most vulnerable to COVID-19 and to economic recessions. These jobs are often associated with food service, accommodations, retail, and customer service. During COVID-19, we also see that production occupations are vulnerable but as the pandemic’s negative production effects decrease, this vulnerability will reverse.

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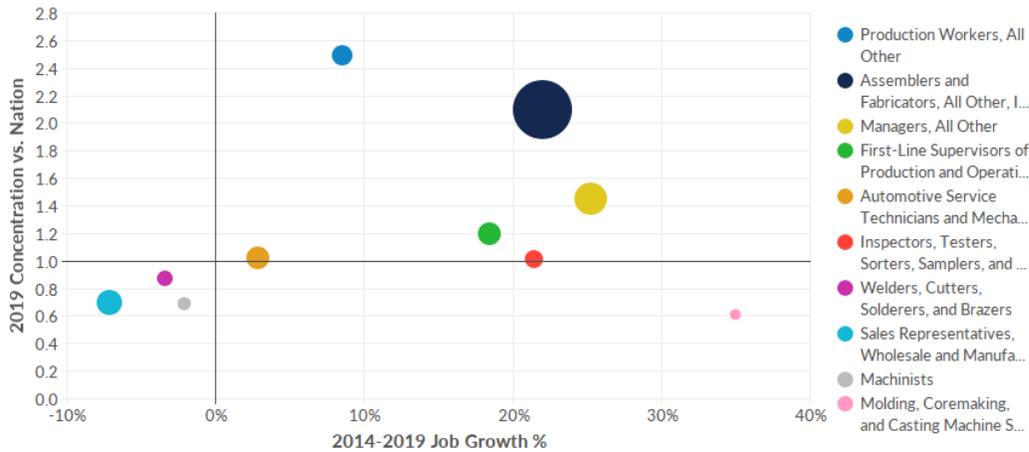
<sup>16</sup> The Brookings Institution

<sup>17</sup> IBID

<sup>18</sup> McKinsey & Company, JobsEq

### Automotive Cluster:

According to the Bureau of Labor Statistics (BLS), this cluster has 104 businesses and employs 30,921 people in the economic region. Jobs in automotive experienced 18.1% growth in the region between 2014 and 2019, over two times the national growth rate of 11.3%. Industry employment growth is projected to increase by 8.3% compared to national growth levels of 5.4%. Occupational concentration or LQ is 1.47, indicating a workforce availability 47% above other MSAs. Combined with 13% overall job growth for these specific occupations it is clear the talent pool for these workers is increasing.

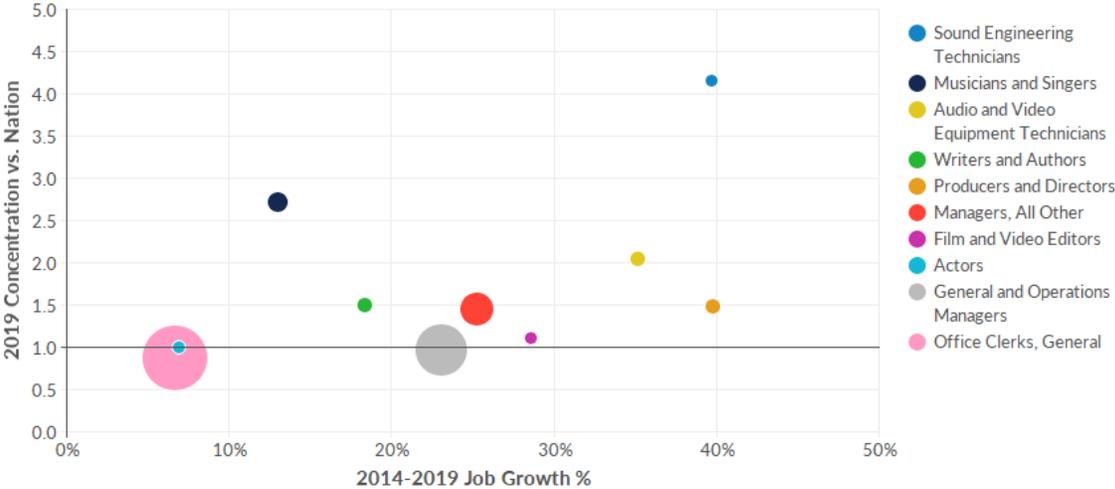


SOC	Key Occupation	LQ	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
51-9199	Production Workers, All Other	2.50	4,481	4,861	5,193	\$12.73	\$13.37
51-2098	Assemblers and Fabricators, All Other, Including Team Assemblers	2.10	17,532	21,381	22,361	\$17.30	\$18.28
11-9199	Managers, All Other	1.46	7,931	9,931	10,741	\$31.88	\$37.18
51-1011	First-Line Supervisors of Production and Operating Workers	1.20	4,858	5,752	6,169	\$27.52	\$28.86
49-3023	Automotive Service Technicians and Mechanics	1.02	5,762	5,927	6,273	\$18.10	\$19.81
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	1.01	3,590	4,359	4,356	\$17.11	\$18.93
51-4121	Welders, Cutters, Solderers, and Brazers	0.87	2,877	2,779	2,952	\$18.79	\$19.28
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	0.70	8,140	7,556	8,108	\$23.94	\$30.92
51-4041	Machinists	0.69	2,096	2,051	2,188	\$19.54	\$20.61
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	0.61	556	750	796	\$16.95	\$18.51
	Total	1.47	57,822	65,347	69,137		\$23.48

Highlighted are the key occupations that have an LQ lower than 1.

**Music & Performing Arts Cluster:**

According to the BLS, this cluster has 911 businesses and employs approximately 12,436 people in the economic region.<sup>19</sup> Jobs in the Music and Performing Arts cluster experienced 36.9% growth in the region between 2014 and 2019, over two times the national growth rate of 14.2%. Occupational concentration or LQ is 2.14, indicating a workforce availability 114% above other MSAs. Combined with 34.4% overall job growth for these specific occupations, the talent pool for these workers continues to grow in the region. Of the traded clusters, the music industry cluster has been most negatively impacted by COVID-19.



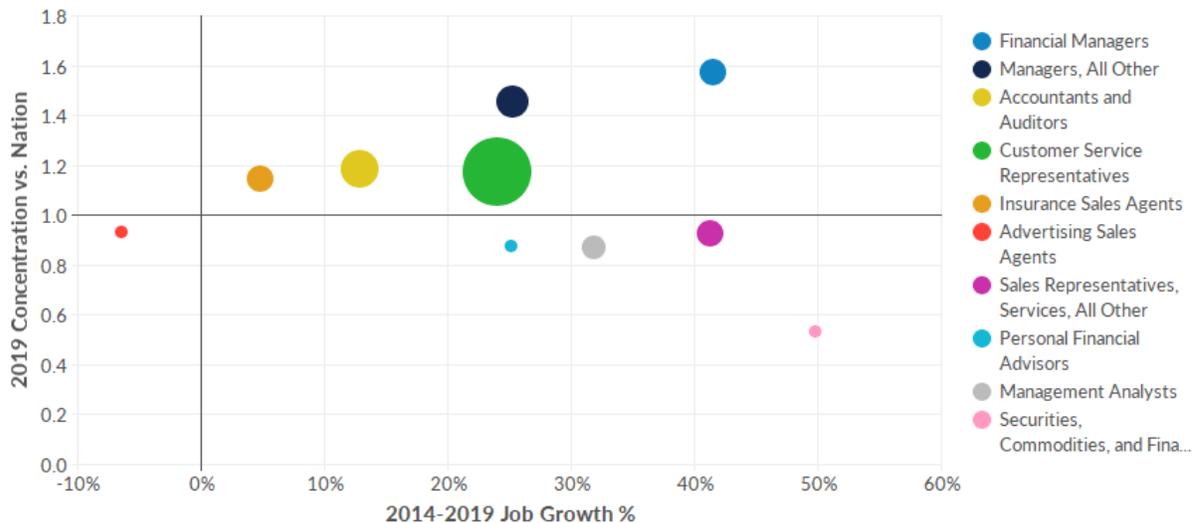
SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
27-4014	Sound Engineering Technicians	4.16	443	618	675	\$24.84	\$30.92
27-2042	Musicians and Singers	2.71	3,509	3,966	4,225	\$28.08	\$44.12
27-4011	Audio and Video Equipment Technicians	2.05	1,169	1,579	1,739	\$22.06	\$24.47
27-3043	Writers and Authors	1.51	1,429	1,691	1,858	\$25.62	\$40.38
27-2012	Producers and Directors	1.49	1,148	1,604	1,730	\$27.16	\$37.00
11-9199	Managers, All Other	1.46	7,931	9,931	10,741	\$31.88	\$37.18

<sup>19</sup> Employment in this cluster is far more significant than a purely NAICS based approach can capture. The standardized gathering of data from BLS undercounts actual employment because music related occupations cross into multiple sectors.

53-7062	Laborers and Freight, Stock, and Material Movers, Hand	1.43	22,800	32,335	36,573	\$13.70	\$14.38
27-1011	Art Directors	1.21	526	776	870	\$25.82	\$35.82
27-4032	Film and Video Editors	1.10	258	331	378	\$29.52	\$40.18
27-2011	Actors	1.00	483	516	577	\$24.11	\$47.85
	Total	2.14	39,696	53,349	59,366		\$23.63

### Business Services Cluster:

According to the BLS, this cluster has 9,007 businesses and employs approximately 150,717 people in the economic region. Business related jobs in this cluster experienced 26.5% growth in the region between 2014 and 2019, over two times the national growth rate of 10.6%. Occupational concentration or LQ is 0.99, indicating a workforce availability just below the national average. Combined with 21.4% overall job growth for these specific occupations, the talent pool for these workers continues to grow in the region and presents an opportunity for additional job growth in the economic region. While the administrative services segment of this cluster has been impacted significantly, high skilled business and finance occupations have been able to navigate COVID related jobs losses much more successfully than other sectors and industries.



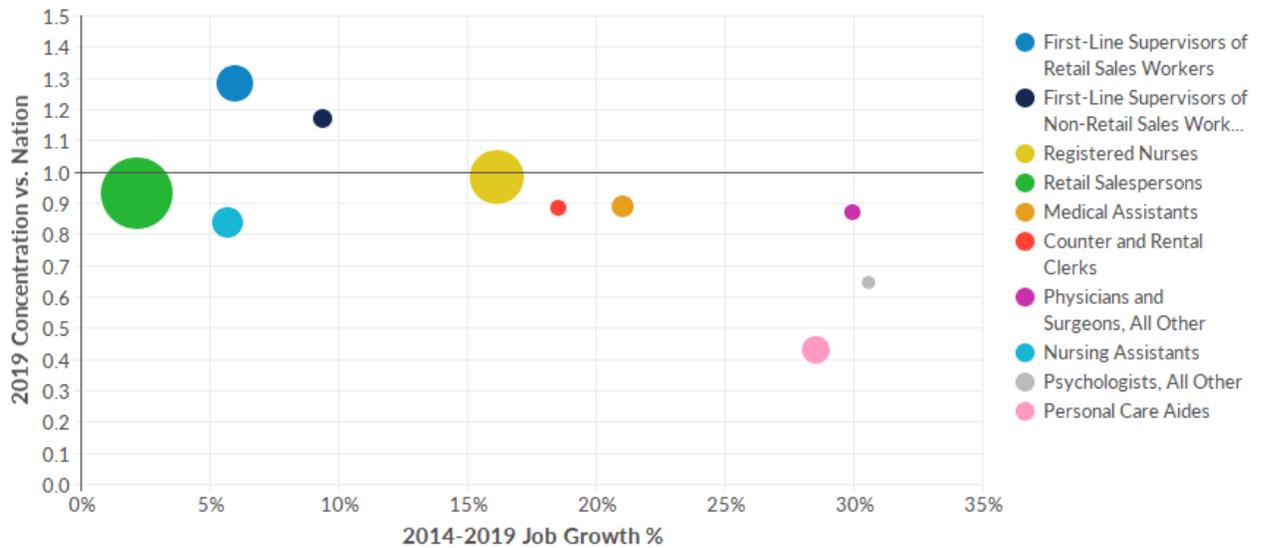
SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
11-9199	Managers, All Other	1.46	7,931	9,931	10,741	\$31.88	\$37.18
27-3041	Editors	1.27	1,137	1,236	1,275	\$22.47	\$27.37
13-2011	Accountants and Auditors	1.18	11,312	12,767	14,379	\$30.62	\$34.29
43-4051	Customer Service Representatives	1.18	20,703	25,669	27,360	\$15.96	\$17.15
27-4021	Photographers	1.16	1,160	1,180	1,217	\$16.96	\$28.88
41-3099	Sales Representatives, Services, All Other	0.93	5,739	8,107	9,258	\$24.10	\$30.65
13-1111	Management Analysts	0.87	4,440	5,854	6,902	\$36.30	\$45.55
17-1011	Architects, Except Landscape and Naval	0.85	720	855	918	\$34.33	\$39.20

23-1011	Lawyers	0.76	4,372	4,731	5,111	\$46.63	\$61.73
41-9041	Telemarketers	0.45	886	571	612	\$15.11	\$15.83
	Total	0.99	58,398	70,899	77,774		\$30.53

Highlighted are the key occupations that have an LQ lower than 1.

### Health Care (Nontraded) Cluster:

Health care encompasses approximately 4,942 establishments and, according to the BLS, employs approximately 141,139 people in the economic region. Health care related jobs in this cluster experienced 11.3% growth in the region between 2014 and 2019, over 1.3 times the national growth rate of 8.7%. Occupational concentration or LQ is 0.87, indicating a workforce availability below the national average. Despite this, the top occupations in this cluster have seen an overall job growth of 10.2%, which indicates the talent pool for these workers continues to grow in the region, while the concentration of these occupations presents an opportunity for workforce development.



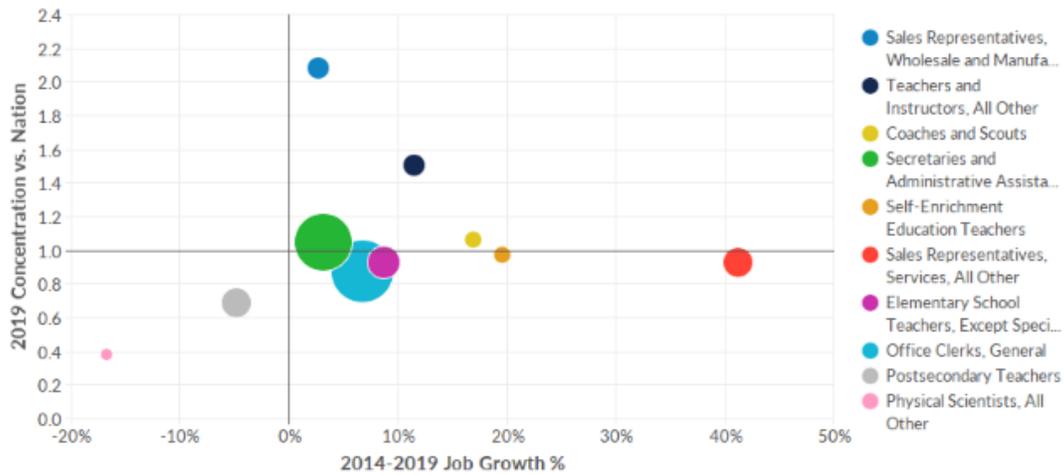
SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
41-1011	First-Line Supervisors of Retail Sales Workers	1.29	12,696	13,451	14,166	\$17.83	\$21.01
41-1012	First-Line Supervisors of Non-Retail Sales Workers	1.17	2,863	3,131	3,344	\$33.28	\$40.62
29-1141	Registered Nurses	0.98	19,208	22,307	25,261	\$30.62	\$31.22
41-2031	Retail Salespersons	0.93	30,764	31,426	33,393	\$11.45	\$14.84
31-9092	Medical Assistants	0.89	3,958	4,790	5,721	\$16.07	\$16.87
41-2021	Counter and Rental Clerks	0.88	2,441	2,893	3,380	\$11.65	\$13.88
29-1069	Physicians and Surgeons, All Other	0.87	2,178	2,830	3,184	\$107.05	\$114.86

31-1014	Nursing Assistants	0.84	8,929	9,437	10,281	\$13.45	\$13.71
19-3039	Psychologists, All Other	0.65	211	276	306	\$45.89	\$54.10
39-9021	Personal Care Aides	0.43	6,352	8,165	9,681	\$10.05	\$10.79
	Total	0.87	89,600	98,705	108,717		\$22.80

Highlighted are the key occupations that have an LQ lower than 1.

### Education and Knowledge (Semi-traded) Cluster:

According to the BLS, educational and knowledge industries encompass approximately 890 establishments and employs approximately 32,045 people in the economic region. Education related jobs in this cluster experienced 11.2% growth in the region between 2014 and 2019, over 1.2 times the national growth rate of 9.4%. Occupational concentration or LQ is 1.04, indicating a workforce availability above the national average. The top occupations in this cluster have seen an overall job growth of 10.2%, which indicates the talent pool for these workers continues to grow in the region, while the concentration of these occupations presents an opportunity for workforce development.



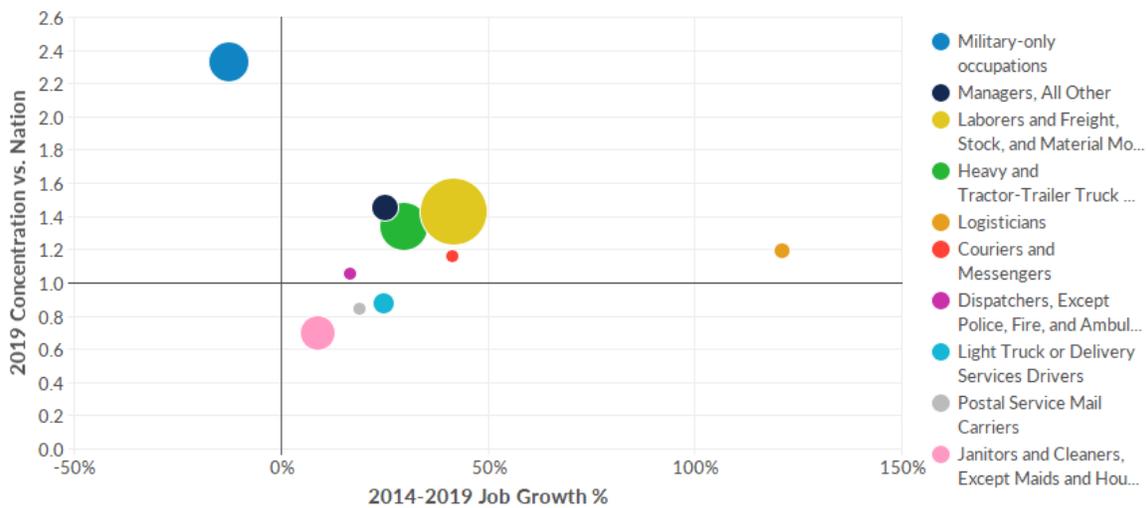
SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	2.08	5,217	5,357	5,636	\$29.83	\$40.55
25-3097	Teachers and Instructors, All Other	1.51	4,237	4,723	5,075	\$20.19	\$23.87
27-2022	Coaches and Scouts	1.07	1,902	2,224	2,476	\$16.76	\$24.94
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	1.05	19,708	20,326	20,814	\$16.99	\$17.65
25-3021	Self-Enrichment Education Teachers	0.97	2,463	2,946	3,314	\$18.56	\$24.95
41-3099	Sales Representatives, Services, All Other	0.93	5,739	8,107	9,258	\$24.10	\$30.65

25-2021	Elementary School Teachers, Except Special Education	0.93	9,052	9,844	10,576	\$25.56	\$26.32
43-9061	Office Clerks, General	0.88	21,082	22,492	23,749	\$16.59	\$17.94
25-1099	Postsecondary Teachers	0.69	8,139	7,748	8,017	\$31.46	\$37.78
19-2099	Physical Scientists, All Other	0.39	85	71	77	\$32.10	\$47.48
	Total	1.04	77,625	83,838	88,992		\$24.15

Highlighted are the key occupations that have an LQ lower than 1.

### Federal Cluster – Military & Postal Service Cluster

According to the BLS, Federal Government industries encompass approximately 7 establishments and employs approximately 33,362 people in the economic region. Military and postal related jobs in this cluster experienced -8.7% decline in the region between 2014 and 2019, over 3.2 times the national rate of decline of -2.7%. Jobs are expected to grow by 0.4% regionally versus 0.3% nationally. Occupational concentration or LQ is 1.26, indicating a workforce availability 26% above the national average. The top occupations in this cluster have seen an overall job growth of 20.8%, which indicates the talent pool for these workers continues to grow in the region, but with job declines in these industries, work force development has a pipeline of workers to target.<sup>20</sup>



SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
55-9999	Military-only occupations	2.33	18,737	16,379	16,422	\$13.37	\$17.17
11-9199	Managers, All Other	1.46	7,931	9,931	10,741	\$31.88	\$37.18
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	1.43	22,800	32,335	36,573	\$13.70	\$14.38
53-3032	Heavy and Tractor-Trailer Truck Drivers	1.34	16,290	21,148	24,155	\$21.44	\$22.89
13-1081	Logisticians	1.20	1,048	2,318	2,528	\$30.72	\$34.47
43-5021	Couriers and Messengers	1.17	706	998	1,156	\$12.91	\$14.65
43-5032	Dispatchers, Except Police, Fire, and Ambulance	1.06	1,401	1,636	1,820	\$17.16	\$18.46

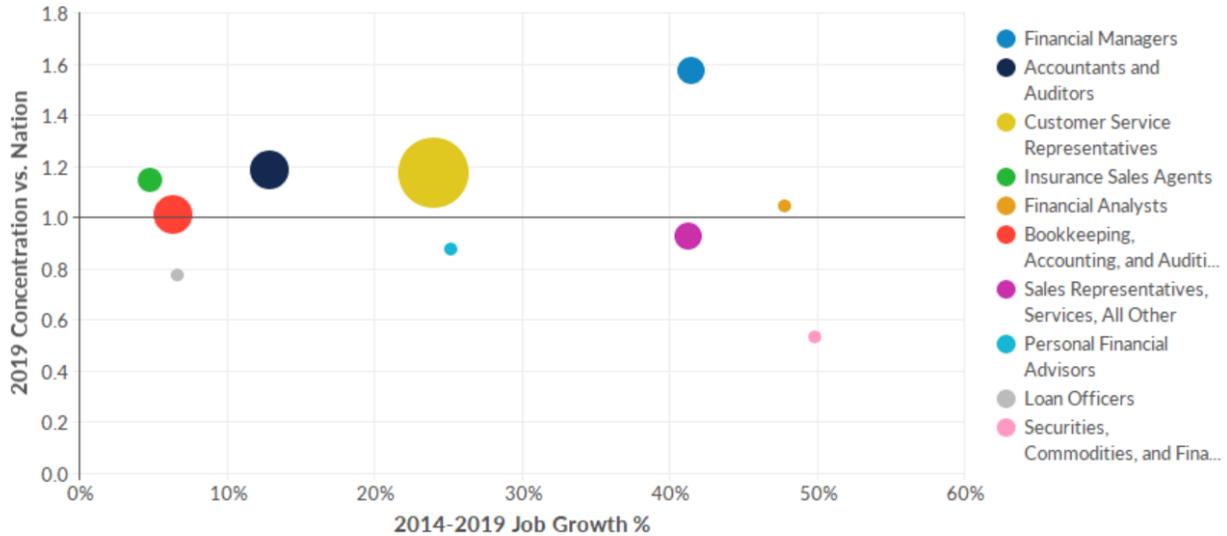
<sup>20</sup> Occupations are not limited to a particular cluster or sector, so while a given cluster or industry may see job declines, the occupations and skills themselves may experience growth within the region.

Highlighted are the key occupations that have an LQ lower than 1.

53-3033	Light Truck or Delivery Services Drivers	0.88	5,330	6,655	7,630	\$16.12	\$17.78
43-5052	Postal Service Mail Carriers	0.84	1,741	2,074	2,011	\$24.39	\$24.80
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	0.70	12,494	13,620	15,441	\$12.23	\$13.67
	Total	1.25	88,479	107,095	118,479		\$19.42

**Finance and Insurance Services Cluster:**

Finance and insurance industries encompass approximately 4,264 establishments, according to the BLS, and employs approximately 58,523 people in the economic region. Jobs in this cluster experienced 12.8% growth in the region between 2014 and 2019, over 1.5 times the national growth rate of 8.2%. Occupational concentration or LQ is 1.01, indicating a workforce availability very slightly above the national average. The top occupations in this cluster have seen an overall job growth of 20.5%, which indicates the talent pool for these workers continues to grow in the region, while the concentration of these occupations presents an opportunity for workforce development.



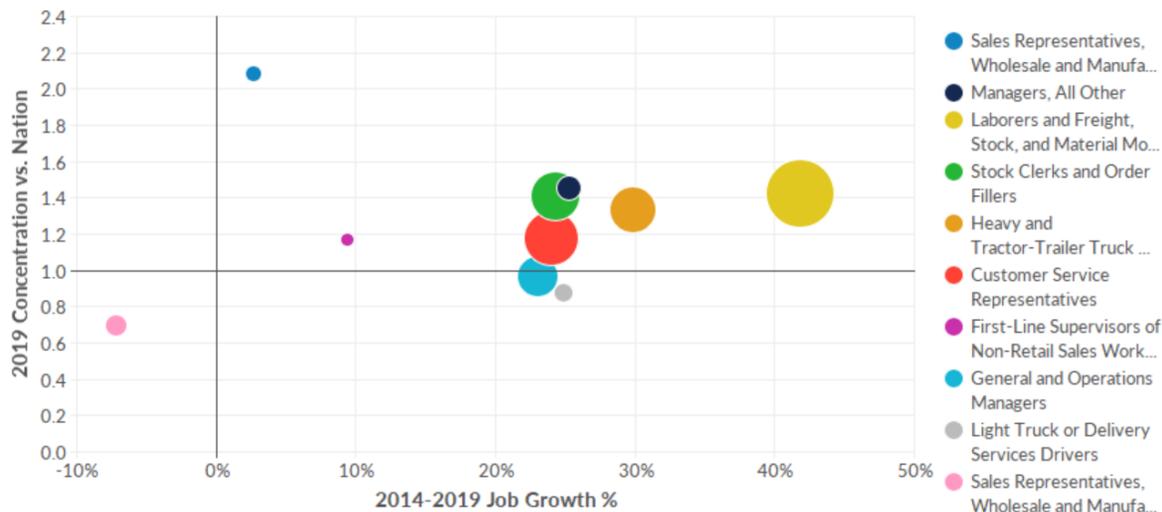
SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
11-3031	Financial Managers	1.58	5,483	7,757	8,924	\$51.30	\$59.51
13-2011	Accountants and Auditors	1.18	11,312	12,767	14,379	\$30.62	\$34.29
43-4051	Customer Service Representatives	1.18	20,703	25,669	27,360	\$15.96	\$17.15
41-3021	Insurance Sales Agents	1.15	6,973	7,303	7,817	\$22.03	\$30.85
13-2051	Financial Analysts	1.05	1,725	2,550	2,920	\$34.34	\$37.68
43-3031	Bookkeeping, Accounting, and Auditing Clerks	1.01	12,215	12,990	13,898	\$19.62	\$20.85
41-3099	Sales Representatives, Services, All Other	0.93	5,739	8,107	9,258	\$24.10	\$30.65
13-2052	Personal Financial Advisors	0.88	1,344	1,683	1,969	\$34.35	\$50.83
13-2072	Loan Officers	0.77	1,660	1,770	1,968	\$28.16	\$33.37

41-3031	Securities, Commodities, and Financial Services Sales Agents	0.54	1,213	1,817	2,101	\$27.37	\$39.70
	Total	1.01	68,368	82,413	90,593		\$29.08

Highlighted are the key occupations that have an LQ lower than 1.

### Distribution & Electronic Commerce Cluster:

According to the BLS, distribution and electronic commerce industries encompass approximately 4,594 establishments and employs approximately 67,400 people in the economic region. Jobs in this cluster experienced 21.5% growth in the region between 2014 and 2019, over three times the national growth rate of 7.4%. Occupational concentration or LQ is 1.10, indicating a workforce availability 10% above the national average. The top occupations in this cluster have seen an overall job growth of 24.8%, which indicates the talent pool for these workers continues to grow in the region, while the concentration of these occupations still presents an opportunity for workforce development.



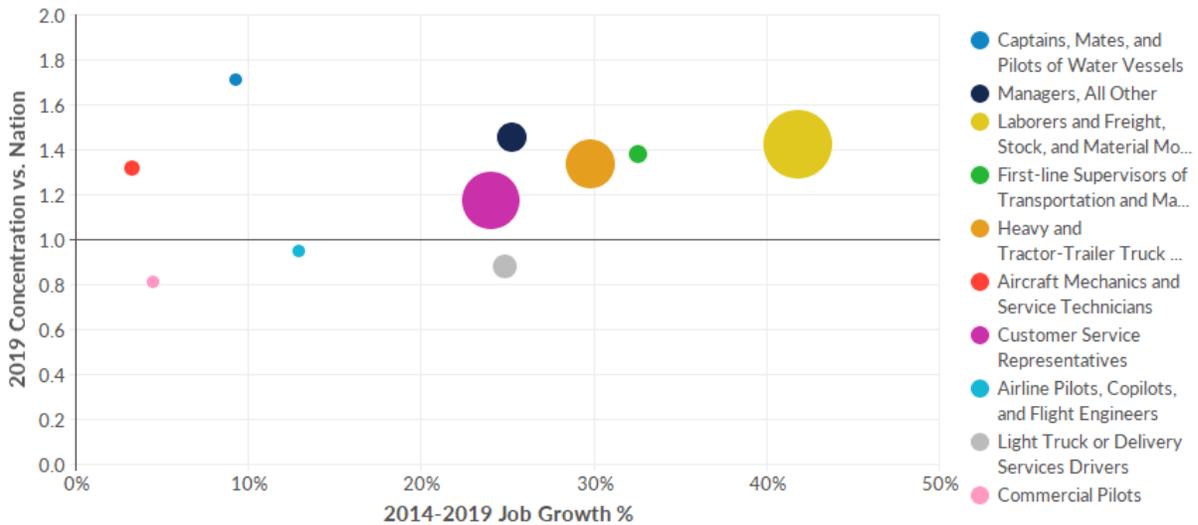
SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	2.08	5,217	5,357	5,636	\$29.83	\$40.55
11-9199	Managers, All Other	1.46	7,931	9,931	10,741	\$31.88	\$37.18
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	1.43	22,800	32,335	36,573	\$13.70	\$14.38
43-5081	Stock Clerks and Order Fillers	1.41	17,536	21,787	23,586	\$12.10	\$12.76
53-3032	Heavy and Tractor-Trailer Truck Drivers	1.34	16,290	21,148	24,155	\$21.44	\$22.89
43-4051	Customer Service Representatives	1.18	20,703	25,669	27,360	\$15.96	\$17.15

Highlighted are the key occupations that have an LQ lower than 1.

41-1012	First-Line Supervisors of Non-Retail Sales Workers	1.17	2,863	3,131	3,344	\$33.28	\$40.62
11-1021	General and Operations Managers	0.97	14,122	17,373	19,489	\$44.87	\$56.05
53-3033	Light Truck or Delivery Services Drivers	0.88	5,330	6,655	7,630	\$16.12	\$17.78
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	0.70	8,140	7,556	8,108	\$23.94	\$30.92
	Total	1.10	120,931	150,943	166,623		\$24.56

**Transportation and Logistics Cluster:**

the Transportation and logistics cluster encompasses approximately 1,105 companies, according to the BLS, and employs approximately 29,747 people in the economic region. Jobs in this cluster experienced 24.1% growth in the region between 2014 and 2019, over 2.4 times the national growth rate of 10.1%. Occupational concentration or LQ is 1.28, indicating a workforce availability 28% above the national average. The top occupations in this cluster have seen an overall job growth of 30%, which indicates the talent pool for these workers continues to grow significantly in the region.

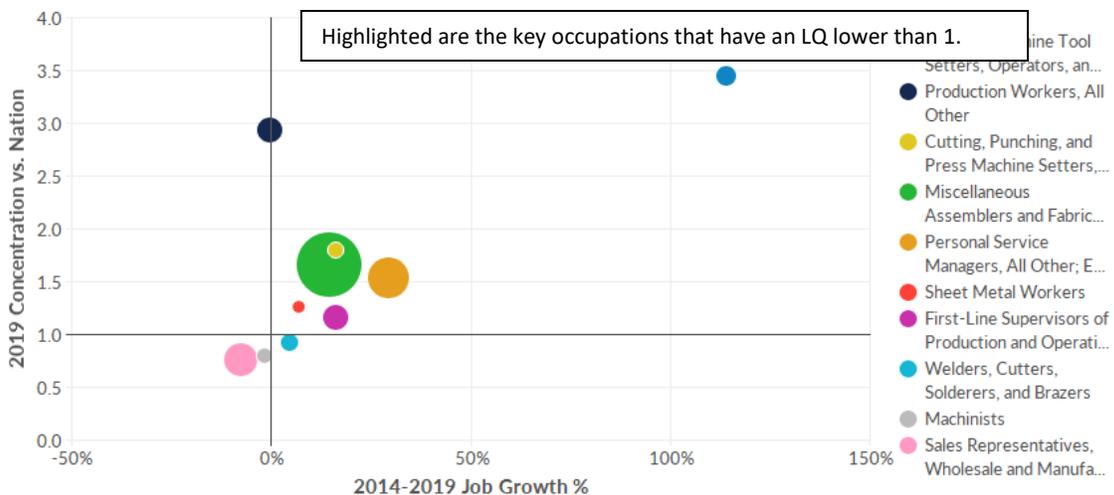


SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
53-5021	Captains, Mates, and Pilots of Water Vessels	1.71	619	676	689	\$25.07	\$32.97
11-9199	Managers, All Other	1.46	7,931	9,931	10,741	\$31.88	\$37.18
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	1.43	22,800	32,335	36,573	\$13.70	\$14.38
53-1048	First-line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	1.38	3,339	4,427	5,029	\$24.41	\$25.86
53-3032	Heavy and Tractor-Trailer Truck Drivers	1.34	16,290	21,148	24,155	\$21.44	\$22.89
49-3011	Aircraft Mechanics and Service Technicians	1.32	1,876	1,938	1,939	\$24.23	\$27.26

43-4051	Customer Service Representatives	1.18	20,703	25,669	27,360	\$15.96	\$17.15
53-2011	Airline Pilots, Copilots, and Flight Engineers	0.95	800	903	952	\$57.53	\$55.41
53-3033	Light Truck or Delivery Services Drivers	0.88	5,330	6,655	7,630	\$16.12	\$17.78
53-2012	Commercial Pilots	0.81	328	343	355	\$41.76	\$44.02
	Total	1.28	80,016	104,026	115,424		\$20.49

### Metals Manufacturing Cluster:

According to the BLS, this cluster has 328 businesses and employs 10,607 people in the economic region. Jobs in metals manufacturing experienced 13.7% growth in the region between 2014 and 2019, over 8.5 times the national growth rate of 1.6%. Industry growth is projected to increase by 4.7% compared to national growth levels of 2%. Key occupational concentration or LQ is 1.49, indicates a workforce availability 49% above other MSAs. Combined with 13.7% overall job growth for these specific occupations and it is clear the talent pool for these workers is increasing.



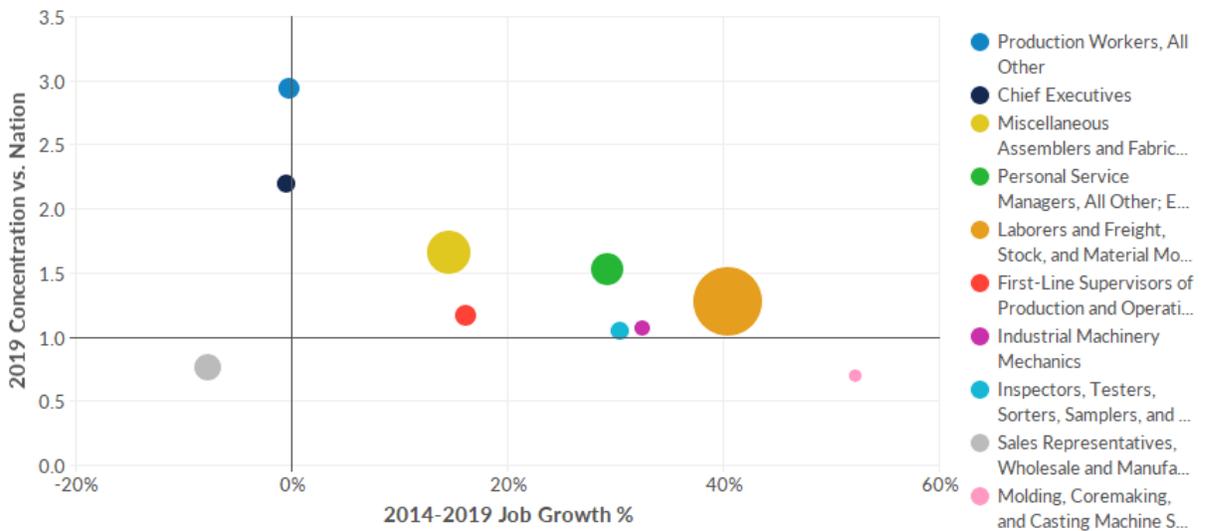
SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
51-4081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	3.45	1,827	3,911	4,110	\$16.79	\$17.87
51-9199	Production Workers, All Other	2.94	5,470	5,456	5,755	\$12.75	\$13.86
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	1.80	2,267	2,636	2,681	\$17.09	\$17.58
51-2098	Miscellaneous Assemblers and Fabricators	1.67	15,080	17,269	18,108	\$17.02	\$18.06
11-9198	Personal Service Managers, All Other; Entertainment and Recreation Managers, Except Gambling; and Managers, All Other	1.54	8,121	10,497	11,423	\$31.77	\$37.20
47-2211	Sheet Metal Workers	1.26	1,258	1,344	1,478	\$22.27	\$22.28

51-1011	First-Line Supervisors of Production and Operating Workers	1.17	4,842	5,619	6,029	\$27.87	\$28.76
51-4121	Welders, Cutters, Solderers, and Brazers	0.93	2,902	3,030	3,230	\$20.25	\$20.63
51-4041	Machinists	0.80	2,384	2,341	2,488	\$18.91	\$20.05
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	0.76	8,829	8,138	8,777	\$23.53	\$29.81
	Total	1.49	52,979	60,241	64,078		\$23.87

Highlighted are the key occupations that have an LQ lower than 1.

**Plastics & Rubber Manufacturing Cluster:**

The Plastics and Rubber Manufacturing Cluster has 94 businesses and employs 5,188 people in the economic region, according to the BLS. Jobs in plastics manufacturing experienced 25.7% growth in the region between 2014 and 2019, over three times the national growth rate of 8.6%. Industry growth is projected to increase by 6.4% compared to national growth levels of 1.4%. Key occupational concentration or LQ is 1.38, indicating a workforce availability 38% above other MSAs. Combined with 20.4% overall job growth for these specific occupations and it is clear that the talent pool for these workers is increasing.



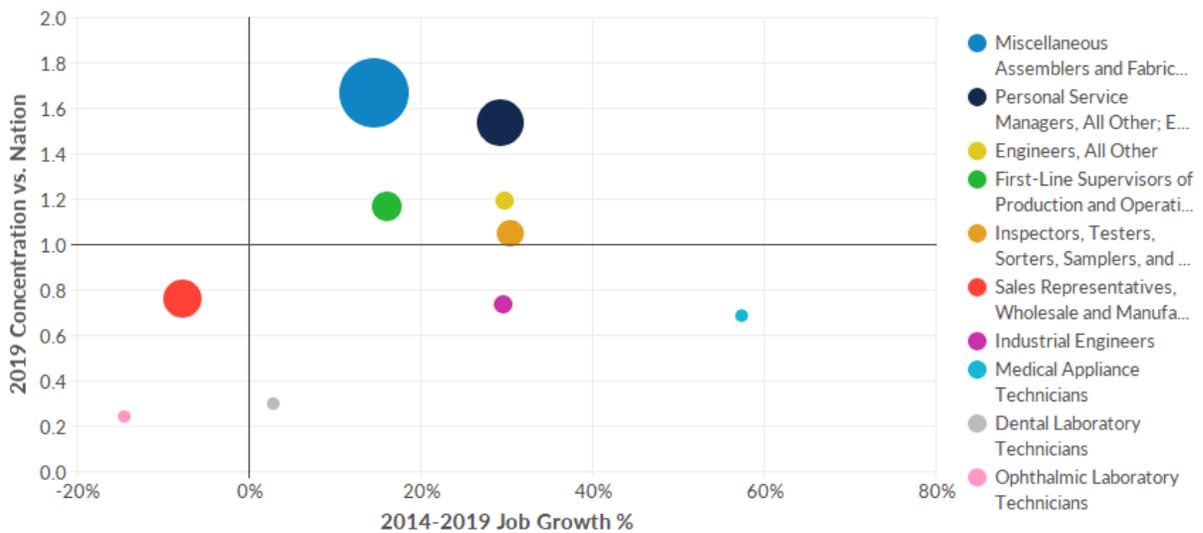
SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
51-9199	Production Workers, All Other	2.94	5,470	5,456	5,755	\$12.75	\$13.86
11-1011	Chief Executives	2.19	4,496	4,471	4,529	\$71.08	\$82.04
51-2098	Miscellaneous Assemblers and Fabricators	1.67	15,080	17,269	18,108	\$17.02	\$18.06
11-9198	Personal Service Managers, All Other; Entertainment and Recreation Managers, Except Gambling; and Managers, All Other	1.54	8,121	10,497	11,423	\$31.77	\$37.20
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	1.28	20,764	29,138	33,198	\$14.29	\$14.81
51-1011	First-Line Supervisors of Production and Operating Workers	1.17	4,842	5,619	6,029	\$27.87	\$28.76
49-9041	Industrial Machinery Mechanics	1.07	2,418	3,201	3,481	\$24.13	\$25.34

51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	1.05	3,597	4,690	4,705	\$17.45	\$19.38
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	0.76	8,829	8,138	8,777	\$23.53	\$29.81
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	0.70	592	900	946	\$16.65	\$17.95
	Total	1.38	74,207	89,380	96,952		\$24.26

Highlighted are the key occupations that have an LQ lower than 1.

### Medical Device Manufacturing Cluster:

According to the BLS, this cluster has 72 businesses and employs 1,024 people in the economic region. Jobs in medical device manufacturing experienced nearly 100% (99.7%) growth in the region between 2014 and 2019, far outpacing the national growth rate of 5.5%. Industry growth is projected to increase by 27.7% in Middle TN compared to national growth levels of 4.4%. Key occupational concentration or LQ is 0.83, indicating a workforce availability 17% below other MSAs. With an expected 15.1% overall job growth for these specific occupations, not only is the talent pool for these workers is increasing, but also presents an opportunity for workforce development.



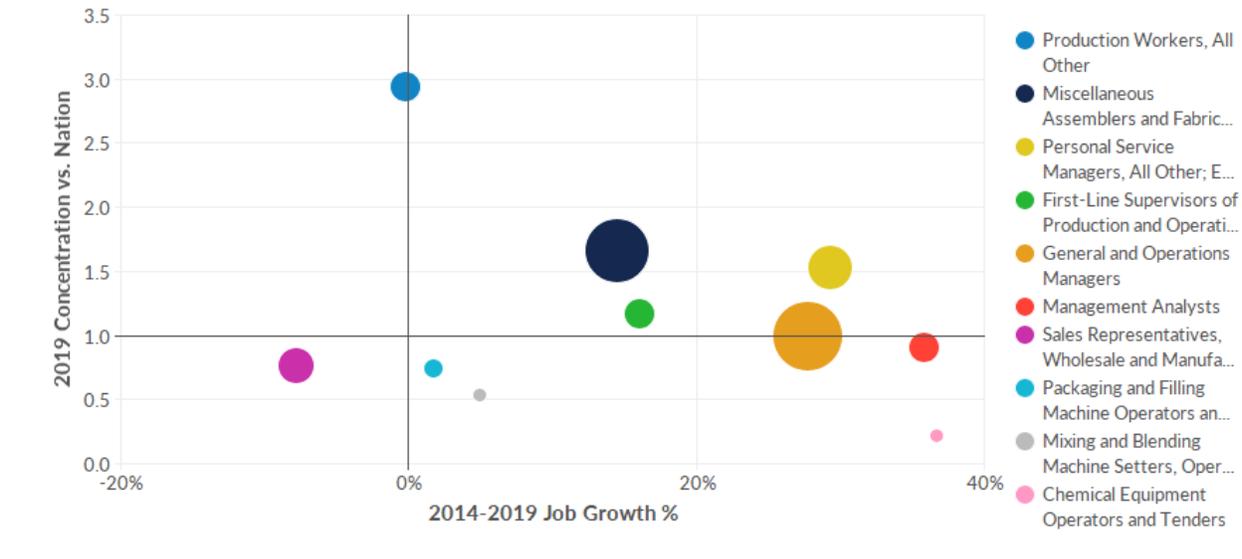
SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
51-2098	Miscellaneous Assemblers and Fabricators	1.67	15,080	17,269	18,108	\$17.02	\$18.06
11-9198	Personal Service Managers, All Other; Entertainment and Recreation Managers, Except Gambling; and Managers, All Other	1.54	8,121	10,497	11,423	\$31.77	\$37.20
17-2199	Engineers, All Other	1.19	1,210	1,570	1,695	\$37.32	\$40.96
51-1011	First-Line Supervisors of Production and Operating Workers	1.17	4,842	5,619	6,029	\$27.87	\$28.76

51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	1.05	3,597	4,690	4,705	\$17.45	\$19.38
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	0.76	8,829	8,138	8,777	\$23.53	\$29.81
17-2112	Industrial Engineers	0.74	1,258	1,630	1,907	\$39.09	\$41.27
51-9082	Medical Appliance Technicians	0.69	51	80	96	\$16.23	\$16.80
51-9081	Dental Laboratory Technicians	0.30	83	86	109	\$18.65	\$21.76
51-9083	Ophthalmic Laboratory Technicians	0.25	68	58	80	\$16.54	\$17.76
	Total	0.83	43,137	49,637	52,930		\$26.86

Highlighted are the key occupations that have an LQ lower than 1.

**Chemical Manufacturing Cluster:**

According to the BLS, this cluster which includes biopharmaceutical manufacturing has 136 businesses and employs 3,832 people in the economic region. Jobs in chemical manufacturing experienced 18.3% growth in the region between 2014 and 2019, three times the national growth rate of 6.1%. Industry growth is projected to increase by 14.8% in Middle TN compared to national growth levels of 2.6%. Key occupational concentration or LQ is 1.16, indicating a workforce availability 16% above other MSAs. When coupled with an expected 16.2% overall job growth for these specific occupations, this demonstrates that not only is the talent pool for these workers increasing but it also presents an opportunity to develop talent.

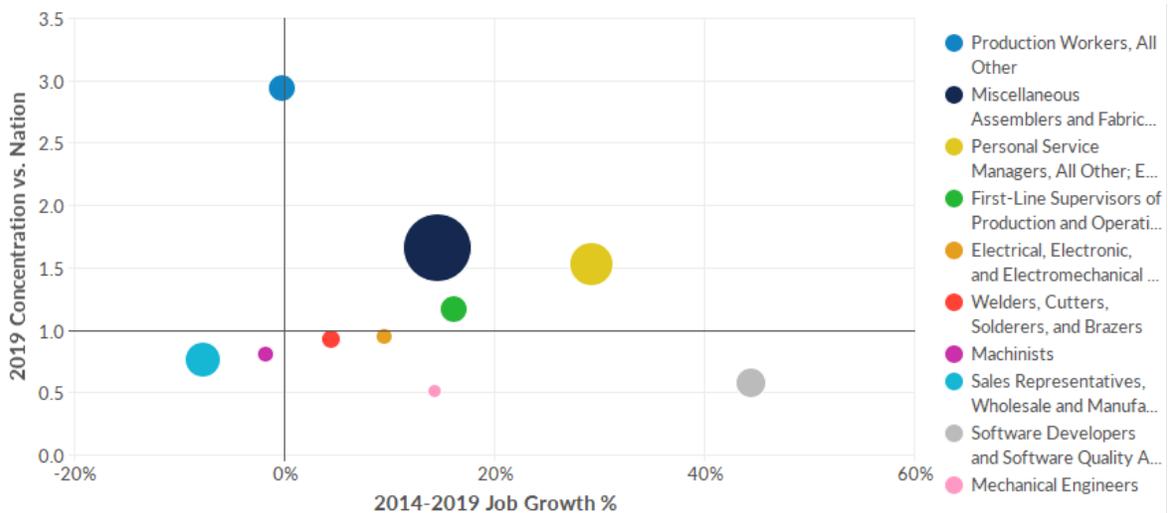


SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
51-9199	Production Workers, All Other	2.94	5,470	5,456	5,755	\$12.75	\$13.86
51-2098	Miscellaneous Assemblers and Fabricators	1.67	15,080	17,269	18,108	\$17.02	\$18.06
11-9198	Personal Service Managers, All Other; Entertainment and Recreation Managers, Except Gambling; and Managers, All Other	1.54	8,121	10,497	11,423	\$31.77	\$37.20

51-1011	First-Line Supervisors of Production and Operating Workers	1.17	4,842	5,619	6,029	\$27.87	\$28.76
11-1021	General and Operations Managers	1.00	14,501	18,517	20,836	\$46.69	\$56.75
13-1111	Management Analysts	0.91	4,575	6,212	7,360	\$36.43	\$45.65
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	0.76	8,829	8,138	8,777	\$23.53	\$29.81
51-9111	Packaging and Filling Machine Operators and Tenders	0.74	2,156	2,194	2,448	\$15.52	\$16.38
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	0.53	481	504	570	\$16.35	\$17.87
51-9011	Chemical Equipment Operators and Tenders	0.22	105	143	183	\$19.92	\$20.39
	Total	1.16	64,159	74,549	81,487		\$34.40

**Other Advanced Manufacturing/Production Technology Cluster:**

According to the BLS, this cluster which includes machinery manufacturing has 943 businesses and employs 17,309 people in the economic region. Jobs in advanced manufacturing and production technology experienced 17.1% growth in the region between 2014 and 2019, 2.3 times the national growth rate of 7.7%. Industry growth is projected to increase by 6.5% in Middle TN compared to national growth levels of 3.2%. Key occupational concentration or LQ is 1.27, indicating a workforce availability 27% above other MSAs. When coupled with an expected 12.7% overall job growth for these specific occupations, this demonstrates that the talent pool for these workers is increasing and presents an opportunity for workforce development.



SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
51-9199	Production Workers, All Other	2.94	5,470	5,456	5,755	\$12.75	\$13.86
51-2098	Miscellaneous Assemblers and Fabricators	1.67	15,080	17,269	18,108	\$17.02	\$18.06
11-9198	Personal Service Managers, All Other; Entertainment and Recreation Managers, Except Gambling; and Managers, All Other	1.54	8,121	10,497	11,423	\$31.77	\$37.20

51-1011	First-Line Supervisors of Production and Operating Workers	1.17	4,842	5,619	6,029	\$27.87	\$28.76
51-2028	Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers	0.95	1,915	2,097	2,195	\$16.54	\$17.75
51-4121	Welders, Cutters, Solderers, and Brazers	0.93	2,902	3,030	3,230	\$20.25	\$20.63
51-4041	Machinists	0.80	2,384	2,341	2,488	\$18.91	\$20.05
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	0.76	8,829	8,138	8,777	\$23.53	\$29.81
15-1256	Software Developers and Software Quality Assurance Analysts and Testers	0.58	4,393	6,344	7,951	\$45.74	\$46.13
17-2141	Mechanical Engineers	0.52	1,059	1,211	1,382	\$40.27	\$44.15
	Total	1.27	54,995	62,003	67,337		\$27.02

### Deficit Occupations for Target Clusters

Among the top occupations for the target clusters, there are several occupations with location quotients below the national average of 1.0. Following is the list of top occupations for each target cluster having lower concentration or supply than required. These represent the second tier of occupations targeted for workforce development within the economic region. Only those occupations where wages are above the regional median wage, that typically also offer benefits are included in this target occupation group as these represent “good” or “promising” jobs. Please recall the regional median wage in the Clarksville MSA is \$16.11 and \$18.37 for the Nashville MSA. For the combined economic region, the median wage is \$18.27.

### Occupations With Below Average Concentrations, Above Median Wages

SOC	Key Occupation	Concentration	2014 Jobs	2019 Jobs	2024 Jobs	Median Hourly Earnings	Average Hourly Earnings
11-1021	General and Operations Managers	0.97	14,122	17,373	19,489	\$44.87	\$56.05
13-1111	Management Analysts	0.87	4,440	5,854	6,902	\$36.30	\$45.55
13-2052	Personal Financial Advisors	0.88	1,344	1,683	1,969	\$34.35	\$50.83
13-2072	Loan Officers	0.77	1,660	1,770	1,968	\$28.16	\$33.37
15-1256	Software Developers and Software Quality Assurance Analysts and Testers	0.58	4,393	6,344	7,951	\$45.74	\$46.13
17-1011	Architects, Except Landscape and Naval	0.85	720	855	918	\$34.33	\$39.20
17-2141	Mechanical Engineers	0.52	1,059	1,211	1,382	\$40.27	\$44.15
17-2112	Industrial Engineers	0.74	1,258	1,630	1,907	\$39.09	\$41.27
19-3039	Psychologists, All Other	0.65	211	276	306	\$45.89	\$54.10
23-1011	Lawyers	0.76	4,372	4,731	5,111	\$46.63	\$61.73
25-1099	Postsecondary Teachers	0.69	8,139	7,748	8,017	\$31.46	\$37.78
25-2021	Elementary School Teachers, Except Special Education	0.93	9,052	9,844	10,576	\$25.56	\$26.32
25-3021	Self-Enrichment Education Teachers	0.97	2,463	2,946	3,314	\$18.56	\$24.95
29-1069	Physicians and Surgeons, All Other	0.87	2,178	2,830	3,184	\$107.05	\$114.86
29-1141	Registered Nurses	0.98	19,208	22,307	25,261	\$30.62	\$31.22
41-3031	Securities, Commodities, and Financial Services Sales Agents	0.54	1,213	1,817	2,101	\$27.37	\$39.70
41-3099	Sales Representatives, Services, All Other	0.93	5,739	8,107	9,258	\$24.10	\$30.65
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	0.76	8,829	8,138	8,777	\$23.53	\$29.81
43-5052	Postal Service Mail Carriers	0.84	1,741	2,074	2,011	\$24.39	\$24.80

43-9061	Office Clerks, General	0.88	21,082	22,492	23,749	\$16.59	\$17.94
51-4121	Welders, Cutters, Solderers, and Brazers	0.93	2,902	3,030	3,230	\$20.25	\$20.63
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	0.61	556	750	796	\$16.95	\$18.51
51-4041	Machinists	0.80	2,384	2,341	2,488	\$18.91	\$20.05
51-9011	Chemical Equipment Operators and Tenders	0.22	105	143	183	\$19.92	\$20.39
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	0.53	481	504	570	\$16.35	\$17.87
51-9081	Dental Laboratory Technicians	0.30	83	86	109	\$18.65	\$21.76
51-9082	Medical Appliance Technicians	0.69	51	80	96	\$16.23	\$16.80
51-9083	Ophthalmic Laboratory Technicians	0.25	68	58	80	\$16.54	\$17.76
53-2011	Airline Pilots, Copilots, and Flight Engineers	0.95	800	903	952	\$57.53	\$55.41
53-2012	Commercial Pilots	0.81	328	343	355	\$41.76	\$44.02

### Occupational Supply Gaps

The economic region faces projected employment gaps for several occupations, including top occupations for target clusters with lower than average concentrations. This chart highlights these occupations at the three-digit SOC level for the economic region. Detailed six-digit and MSA specific occupation deficits and surpluses are available in the appendices of this report. Highlighted in yellow are occupations where wages are below the regional median, which typically do not offer benefits and are not resistant to economic shifts and recessions. It should be noted that the top four occupational categories with annual supply shortages above 300 also are the most resistant occupations to the effects of COVID-19 related employment loss and recessionary impacts. Construction, while having cyclical periods of growth, is often the most susceptible to changes in market conditions, supply impacts, and recession. Additionally, many construction occupations do not pay above the regional median wage. The study does not exclude this occupational subset because it encompasses some high-skill and high wage occupations such as electricians and plumbers, of which the economic region has seen a growing shortage.

Potential Average Annual Occupation Gaps over 5 Years in Nashville & Clarksville MSA										
SOC	Occupation	Annual Supply Gap	Pre-COVID-19 Employment 2020Q1	Annual Growth Demand	Annual Sep Demand	Total Annual Demand	Projected Employment 2030	Accumulated Supply 2025	Accumulated Demand 2025	Avg Wages
29-0000	Healthcare Practitioners and Technical Occupations	(1,005)	72,538	1,592	6,627	8,218	88,456	15,682	20,709	\$75,400
11-0000	Management Occupations	(763)	81,427	1,617	9,747	11,364	97,596	24,580	28,396	\$102,500
13-0000	Business and Financial Operations Occupations	(428)	65,650	1,334	8,755	10,089	78,991	22,783	24,921	\$66,400
15-0000	Computer and Mathematical Occupations	(314)	28,175	746	2,854	3,600	35,632	7,909	9,479	\$77,600
47-0000	Construction and Extraction Occupations	(179)	47,579	1,039	7,449	8,488	57,967	18,938	19,834	\$44,100
49-0000	Installation, Maintenance, and Repair Occupations	(175)	45,086	739	6,298	7,036	52,475	16,479	17,352	\$46,200
25-0000	Educational Instruction and Library Occupations	(153)	55,765	908	7,712	8,619	64,840	19,105	19,870	\$50,700

17-0000	Architecture and Engineering Occupations	(136)	14,870	281	1,682	1,963	17,681	4,262	4,943	\$74,400
21-0000	Community and Social Service Occupations	(79)	18,317	406	2,867	3,274	22,379	7,490	7,884	\$45,900
31-0000	Healthcare Support Occupations	(75)	40,044	1,238	8,026	9,264	52,424	18,721	19,097	\$30,300
19-0000	Life, Physical, and Social Science Occupations	(53)	7,078	141	876	1,017	8,490	2,330	2,595	\$63,500
23-0000	Legal Occupations	(50)	8,042	154	804	958	9,585	2,113	2,362	\$98,500
27-0000	Arts, Design, Entertainment, Sports, and Media Occupations	(32)	25,590	361	4,135	4,496	29,203	9,541	9,703	\$55,400

### Skills Gaps (Certification Deficits)

The region currently has a gap in certifications in several skills, evidenced by the following table. Please note that the complete skills certification list inclusive of surplus certifications is included in the appendices of this report. This study only considers those certification annual gaps that have an annual supply cap above 15, align with the occupational gaps for the region as well as with target clusters, have wages above the regional median wage, and are high employment growth occupations.

Skill Gaps: Nashville & Clarksville MSA (CERTIFICATIONS)			
Skill	Candidates #	Openings #	Gap #
Class A Commercial Driver's License (CDL-A)	690	946	-256
Registered Nurse (RN)	998	1,185	-187
Certified Nursing Assistant (CNA)	760	927	-167
Commercial Driver's License (CDL)	543	676	-133
Licensed Practical Nurse (LPN)	503	607	-104
Nationally Certified Medical Assistant (NCMA)	17	89	-72
National Phlebotomy Association Certified Phlebotomist	58	115	-57
Certified Rehabilitation Counselor (CRC)	26	79	-53
Series 63	38	85	-48
Certified Patient Care Technician/Associate/Nurse Technician (CPCT or CPCA or CNT)	10	53	-43
Certified Coding Specialist (CCS)	23	52	-29
Chemotherapy Certification	3	29	-26
Registered Health Information Technician (RHIT)	26	51	-25
OSHA 10	92	113	-21
Technologist in Cytogenetics (CG)	8	28	-20
Automobile Technician: Engine Repair (Test A1)	3	22	-19
Certified Information Systems Security Professional (CISSP)	48	66	-18
Certified Professional Coder (CPC)	41	58	-16
Medical Assistant Certification (MA)	237	253	-16
Cisco Certified Internetwork Expert (CCIE)	10	24	-15

## Talent Location

The table below highlights for each of the major industry demand and occupational gaps occupation groups, where talent lives and where they work. The complete list by zip code is available in the appendices. [Data table is a place holder that is to be mapped] Understanding the geographic worker commuting patterns by occupational skillset allows targeted economic and workforce development efforts.

Occupation Group	Where Talent Lives (Zip code)	Where Talent Works (Zip code)
Management Occupations	Antioch(37013) Nashville (32711) Hendersonville (37075) Brentwood (37027) Franklin (37064)	Nashville (37203) Brentwood (37027) Franklin (37067) Nashville (37214) Nashville (37211)
Business & Financial Occupations	Antioch (37013) Brentwood (37027) Nashville (37211) Hendersonville (37075) Franklin (37064)	Brentwood (37027) Franklin (37067) Nashville (37214) Nashville (37203) Nashville (37211)
Healthcare Practitioners and Technical Occupations	Antioch (37013) Nashville (37211) Hendersonville (37075) Brentwood (37027) Nashville (37221)	Nashville (37203) Nashville (37205) Nashville (37236) Nashville (37212) Nashville (37232)
Computer & Mathematical Occupations	Antioch (37013) Brentwood (37027) Nashville (37211) Franklin (37064) Nashville (37211)	Franklin (37067) Brentwood (37027) Nashville (37214) Nashville (37203) Nashville (37211)
Production Occupations (Advanced Manufacturing)	Smyrna (37167) Columbia (38401) Murfreesboro (37128) Antioch (37013) Murfreesboro (37129)	Smyrna (37167) Spring Hill (37174) Hopkinsville, KY (42240) Nashville (37210) Nashville (37211)

## Automation and Disruption

In addition to the occupational supply gaps, this study looks at automation and disruptive technologies. Disruptive technologies are those that can change the ways people live and work. In 2013, the McKinsey Global Institute released a report on twelve potentially economically disruptive technologies, listed in the accompanying graphic.

*[PLACEHOLDER FOR GRAPHIC CONTAINING BULLETED INFORMATION]*

- Mobile Internet: increasingly inexpensive and capable mobile computing devices and internet connectivity
- Automation of Knowledge Work: Intelligent software systems that can perform knowledge work tasks involving unstructured commands and subtle judgements

- The Internet of Things: Networks of low-cost sensors and actuators for data collection, monitoring, decision making, and process automation
- Cloud Technology: Use of computer hardware and software resources delivered over a network or the Internet, often as a service
- Advanced Robotics: Increasingly capable robots with enhanced senses, dexterity, and intelligence used to automate tasks or augment humans
- Autonomous and Near-Autonomous Vehicles: Vehicles that can navigate and operate with reduced or no human intervention
- Next-Generation Genomics: Fast, low-cost gene sequencing, advanced big data analytics, and synthetic biology (“writing” DNA)
- Energy Storage: Devices or systems that store energy for later use, including batteries
- 3D Printing: Additive manufacturing techniques to create objects by printing layers of material based on digital models
- Advanced Materials: Materials designed to have superior characteristics (e.g., strength, weight, conductivity) or functionality
- Advanced Oil and Gas Exploration and Recovery: Exploration and recovery techniques that make extraction of unconventional oil and gas economical
- Renewable Energy: Generation of electricity from renewable sources with reduced harmful climate impact

Most of these technologies have the potential to influence the world of work and deeply impact various industries, but for the purposes of this report the focus is on *replacement* of human work or tasks by technology – specifically, automation of knowledge work and advanced robotics.

Physical task automation has been occurring for hundreds of years. Any evolution in work processes because of technological innovation falls into this category. This is a well-researched and well-understood phenomenon, especially when compared to the automation of knowledge work. However, dimensioned understanding of what this has and can develop into is emerging. When referring to physical tasks, the term most often used is “automation” while automation of knowledge work is often referred to as “artificial intelligence”. Both categories contain numerous technologies in various stages of development and adoption. Adoption of automation and AI has to do with how developed technologies are, while adoption rates have to do with cost, return on investment, and sometimes considerations of job elimination. A January 2019 paper released by the Brookings Institution states that almost no occupation will be unaffected by the adoption of currently available technologies<sup>21</sup>. According to the Brookings Institution’s assessment of all currently classified occupations in the Nashville MSA, 25% face high exposure to automation, 36% face medium exposure, and 39% face low exposure. While this number may seem daunting, historically automation of both physical and knowledge work does not always mean loss of jobs, but it does always mean redirection of labor and workforce<sup>22</sup>.

Current technology could fill workforce shortages in the region, and where there is displacement, the challenge will be meeting this transition intentionally. Employers can assess their readiness, policymakers can think and plan proactively about the wellbeing of workers in high risk industries and

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<sup>21</sup> [https://www.brookings.edu/wp-content/uploads/2019/01/2019.01\\_BrookingsMetro\\_Automation-AI\\_Report\\_Muro-Maxim-Whiton-FINAL-version.pdf](https://www.brookings.edu/wp-content/uploads/2019/01/2019.01_BrookingsMetro_Automation-AI_Report_Muro-Maxim-Whiton-FINAL-version.pdf)

<sup>22</sup> [https://www.oxfordmartin.ox.ac.uk/downloads/academic/The\\_Future\\_of\\_Employment.pdf](https://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf)

occupations, and workforce development efforts can target skill areas that are not only less automatable, but also potentially more rewarding for workers.

This segment has two parts: an occupational perspective, and a discussion of how the COVID-19 pandemic could affect this phenomenon.

Automation risk examined from an occupational perspective provides a granular look at how individuals and workers will be impacted. This field is dominated by academics and workforce, policy, or economic development-focused organizations. This research is purposed to give direction to workforce development and policy leaders so that being prepared for the future becomes more tangible.

At the time of writing, the city of Nashville and the State of Tennessee are in various phases of lockdown and using various strategies to attempt virus mitigation. Recovery from this pandemic as it relates to automation and AI will inevitably be a process of continuation in some respects, acceleration, deceleration, and massive pivots in others. While the extent of this will not be fully understood until it is occurring or even more likely in retrospect, present conditions and past patterns can be applied to create a groundwork for being prepared.

### *Occupation*

Most research on occupational automation looks at task content of occupations. This field is dominated by academics, workforce, policy, and economic development-focused organizations. This research is purposed to give direction to workforce development and policy leaders so that being prepared for patterns that can be somewhat unknowable becomes more tangible. Research by Frey and Osborne out of Oxford in 2013 took the first swing at an assessment of all occupations, and almost all indexes that exist today have factored in this research. Researchers used workforce experts, machine learning, and O\*Net data, to create automation probabilities.

O\*Net is a database derived from Bureau of Labor Statistics data, providing information on work activities and time dedicated to certain tasks broken down by occupation (see table below). Using this tool, researchers have been able to examine what current and/or projected technologies could effectively take-over different tasks. Combining this information with the amount of time a given occupation devotes to said tasks, indices can be created. The index that is utilized in this report, from Economic Modeling Specialists, Inc. or EMSI, builds on this research. Their researchers combine the Frey and Osborne findings with further analysis from O\*Net work activities and use this to create a 100-based index. Occupations with an automation index above 100 have an above average risk of automation, while occupations with an automation index of below 100 have a below average risk of automation. The data produced by EMSI used here also uses state data from the Tennessee Department of Labor and Workforce Development, Research and Statistics Division. Other factors include the number of high-risk jobs in compatible occupations and the overall industry automation risk.<sup>23</sup>

Using Sheet Metal Workers, SOC code 47-2211 as an example, the table below shows a handful of elements (there are 42 elements total for this occupation.) of a Sheet Metal Worker, SOC code 47-2211:

<b>SOC</b>	<b>Title</b>	<b>Element Name</b>
47-2211	Sheet Metal Workers	Getting Information

47-2212	Sheet Metal Workers	Monitor Processes, Materials, or Surroundings
47-2213	Sheet Metal Workers	Identifying Objects, Actions, and Events
47-2214	Sheet Metal Workers	Inspecting Equipment, Structures, or Material
47-2215	Sheet Metal Workers	Estimating the Quantifiable Characteristics of Products, Events, or Information
47-2216	Sheet Metal Workers	Judging the Qualities of Things, Services, or People
47-2217	Sheet Metal Workers	Processing Information
47-2218	Sheet Metal Workers	Evaluating Information to Determine Compliance with Standards

Figure (D1). O\*Net

Each work activity has a certain importance and occupational task share allocated to it, and the EMSI index factors in time spent both on low-risk and high-risk work. Imposing a “high risk” threshold of 100, which means that the occupational task content has the potential to be automated at or above the average rate for all occupations, the following was found to be true:

5-digit SOC codes aggregated to the 2-digit level show what share of these high-level occupational groups are at high-risk. The automation index is the same across the Nashville and Clarksville MSAs.:

2-Digit SOC	Description	% of Occupation Group that is at or above the average automation risk
11	Management Occupations	3.0
13	Business and Financial Operations Occupations	3.3
15	Computer and Mathematical Occupations	0
17	Architecture and Engineering Occupations	8.6
19	Life, Physical, and Social Science Occupations	7.0
21	Community and Social Service Occupations	0
23	Legal Occupations	0
25	Education, Training, and Library Occupations	3.7
27	Arts, Design, Entertainment, Sports, and Media Occupations	14.6
29	Healthcare Practitioners and Technical Occupations	3.3
31	Healthcare Support Occupations	29.4
33	Protective Service Occupations	22.7
35	Food Preparation and Serving Related Occupations	94.4
37	Building and Grounds Cleaning and Maintenance Occupations	100
39	Personal Care and Service Occupations	54.8
41	Sales and Related Occupations	31.8
43	Office and Administrative Support Occupations	37.5
45	Farming, Fishing, and Forestry Occupations	86.7
47	Construction and Extraction Occupations	98.3
49	Installation, Maintenance, and Repair Occupations	94.2
51	Production Occupations	97.2
53	Transportation and Material Moving Occupations	62.7

## Figure. (D2): Occupational Groups Automation Risk-Share

Returning to the more granular, 5-digit SOC codes the following was found to be true:

- 356 out of 772 assessed occupations were found to have an automation risk above average. This is about 46%.
- Of the 356 occupations above average risk, 26.7% require no formal educational credential, 62.4% require only a high school diploma or equivalent, 1.0% require some college but no degree, 21% require some postsecondary nondegree award, 2.2% require an associate degree, none require a Bachelor's degree, 1.0% require a master's degree, and none require a Doctoral or Professional degree.
- Only 4.5% of these occupations require any experience, so these are largely entry level positions.

In the Nashville MSA:

- 124 of 356, or 35%, above average risk occupations in the area have a location quotient greater than 1. This means that these occupations are concentrated in the region at a higher rate relative to the national average.
- These above average risk occupations represent \$7,336,401 in total earnings per hour, or \$15,259,714,735 annually.
- Considering projected growth by EMSI, by 2023 this would represent \$8,240,018.34 in total earnings per hour, or \$17,139,238,150 annually. This is with the assumption of stagnant wages as the Bureau of Labor Statistics does not project occupational wages.
- The average annual wage for these occupations is \$37,365.

In the Clarksville MSA:

- 116 of 356, or 33% above average risk occupations in the area have a location quotient greater than 1. This means that these occupations are concentrated in the region at a higher rate relative to the national average.
- These above average risk occupations represent \$788,480 in total earnings per hour, or \$1,640,040,004 annually.
- Considering projected growth by EMSI, by 2023 this would represent \$836,276.39 in total earnings per hour, or \$1,739,454,895.64 annually. This is with the assumption of stagnant wages as the Bureau of Labor Statistics does not project occupational wages.
- The average annual wage for these occupations is \$35,568.81.

### *Trends*

Many occupations that are above average risk for automation are low wage, low entry barrier occupations. Using data from the US Census, it can be seen that there are disparities in educational attainment and earnings along racial and ethnic lines.

EDUCATION						
	White Alone	Black or African American Alone	Asian Alone	Two or More Races	Hispanic or Latino	White, Not Hispanic or Latino
Less than High School	9.2%	11.9%	15.0%	6.9%	36.0%	7.8%
High School Diploma or Equivalent	27.3%	28.2%	17.7%	21.6%	30.2%	26.8%
Some college, no degree	20.0%	24.9%	8.1%	26.4%	12.6%	20.4%
Associate's degree	7.2%	8.0%	5.4%	6.0%	4.3%	7.3%
Bachelor's degree	24.1%	16.6%	29.0%	26.7%	12.0%	24.7%
Graduate or professional degree	12.5%	10.4%	24.8%	12.4%	4.9%	12.9%

Source: American Community Survey 2016-2018 1-Year Estimates, 3 Year Weighted Average

**Figure (X): Nashville MSA p 12 Vital Signs**

EDUCATION				
	White Alone	Black or African American Alone	Hispanic or Latino	White, Not Hispanic or Latino
Less than High School	8.3%	11.7%	13.9%	7.8%
High School Diploma or Equivalent	29.3%	27.8%	20.2%	30.2%
Some college, no degree	27.0%	28.3%	31.1%	26.5%
Associate's degree	9.7%	11.2%	12.2%	9.4%
Bachelor's degree	16.8%	13.8%	15.5%	17.0%
Graduate or professional degree	8.9%	7.2%	7.0%	9.0%

Source: American Community Survey 2016-2018 1-Year Estimates, 3 Year Weighted Average

**Figure (X): Clarksville MSA p 13 Vital Signs**

This can be taken a step further to look at median earnings by educational attainment, race, and ethnicity:

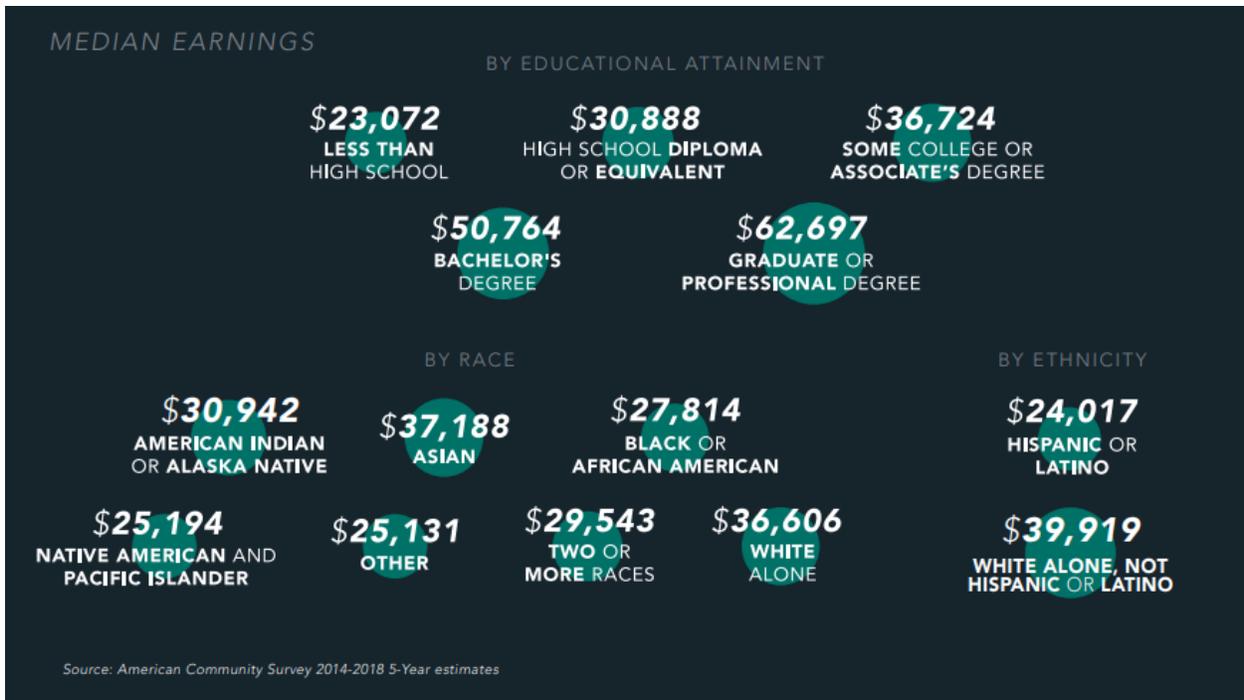


Figure (X). Nashville MSA p 13 Vital Signs

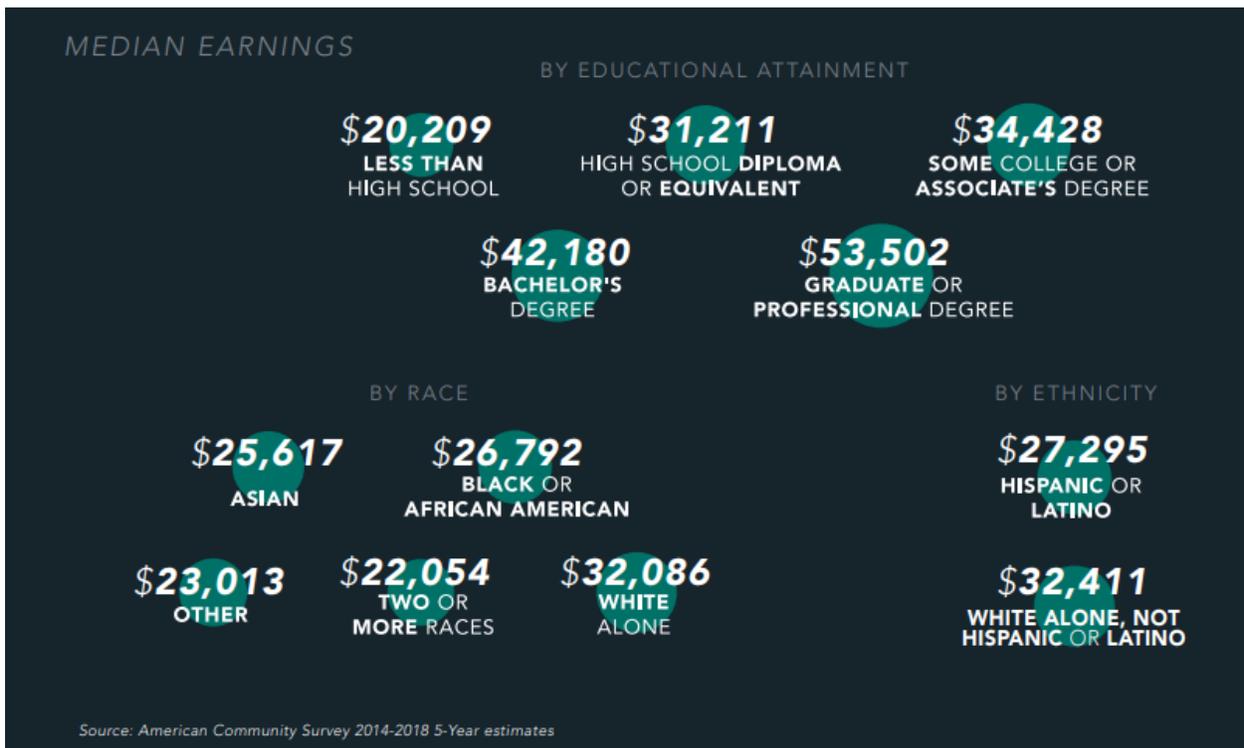


Figure (X): Clarksville MSA p 12 Vital Signs

While this points to current disparity it also points to a disparity as automation takes hold. In this vein, research by CERT released in 2016<sup>24</sup> states that “While automation will create change across Tennessee and particularly in communities with highly vulnerable workforces, the negative connotations we commonly associate with disruption and change may not be realized... To realize and capture the value of automation, businesses, communities and regions must realize this future workforce pattern and prepare for the benefits of disruption”. Benefits range from very cut and dry productivity increases on an industry scale, freeing the workforce from mundane tasks so that people can focus on creative work, to an entire reimagining of the role that work plays in our society on a sociopolitical scale. This is particularly relevant right now as this study is published as the COVID-19 lockdowns are in place.

### *Patterns in Artificial Intelligence*

To complement this, however, there is research pointing to the potential of artificial intelligence specifically disrupting of higher wage occupations. The Brookings Institution has released work on this<sup>25</sup>. In fact, this report states that “AI is a very different technology than earlier types of automation, and is going to most affect a very different part of the workforce... because even less is known about AI than other types of automation, it appears much more ambiguous and confined in its impacts, at least for now”.

Osborne, author of the 2013 research put out of Oxford, has continued to study in this field. Artificial intelligence will fill in the voids where automation meets obstacles in areas such as perception and manipulation, creative intelligence, and social intelligence<sup>26</sup>. While the impacts of AI haven’t played out as much as automation yet, what is a certainty is that all parts of the workforce will be affected by these disruptors in some way or another. There is not the same breadth of data currently available on artificial intelligence by granular occupations, and so findings like the ones addressing automation in the region cannot be provided

### *Automation and Artificial Intelligence in Nashville Area Chamber Member Organizations*

#### **SURVEY RESULTS**

#### **Confidence level of 90% +/- 5, n = 250**

In May 2020, the Nashville Area Chamber asked a series of questions of its membership revolving around technological adaptation, automation, and artificial intelligence. This survey was administered to business owners over the course of Metro Nashville – Davidson County phases one and two reopening. Respondents were asked questions about reopening status, concerns, preparedness, and then both baseline technological adoption questions and as well as questions about how the COVID-19 crisis has affected this part of their business and their talent development plans.

#### **Baseline Evaluations**

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<sup>24</sup> <https://tnecd.com/wp-content/uploads/2018/10/workforcedisruptionindex8-29.pdf>

<sup>25</sup> [https://www.brookings.edu/wp-content/uploads/2019/11/2019.11.20\\_BrookingsMetro\\_What-jobs-are-affected-by-AI\\_Report\\_Muro-Whiton-Maxim.pdf](https://www.brookings.edu/wp-content/uploads/2019/11/2019.11.20_BrookingsMetro_What-jobs-are-affected-by-AI_Report_Muro-Whiton-Maxim.pdf)

<sup>26</sup> [https://www.oxfordmartin.ox.ac.uk/downloads/academic/The\\_Future\\_of\\_Employment.pdf](https://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf)

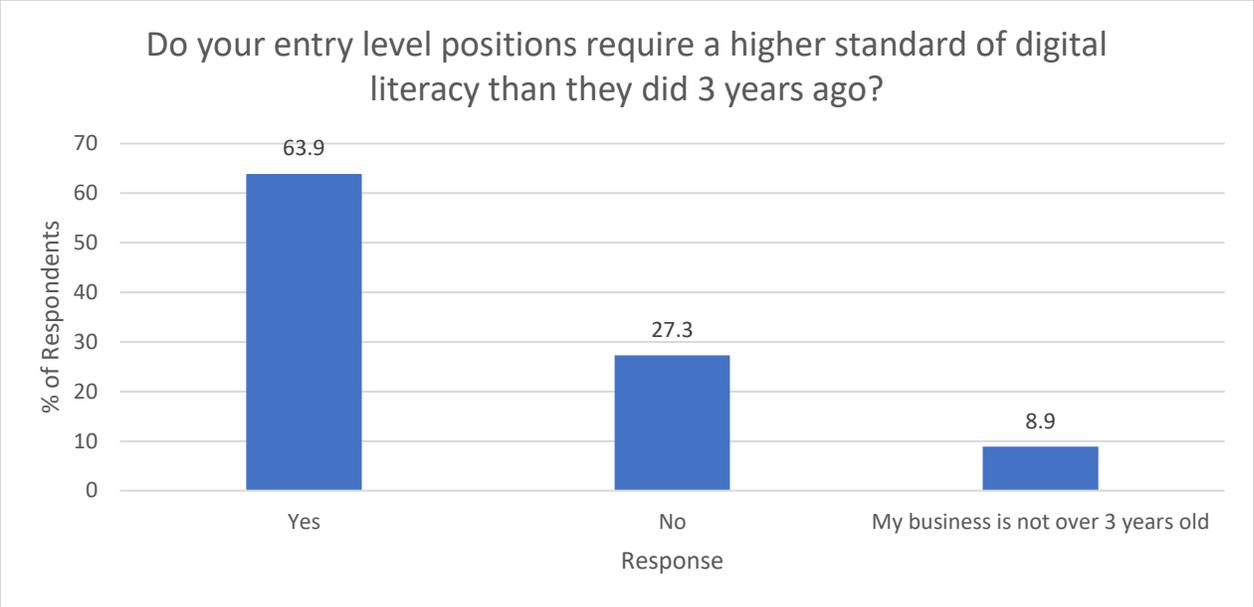


Figure (D3). Nashville Area Chamber Member Survey

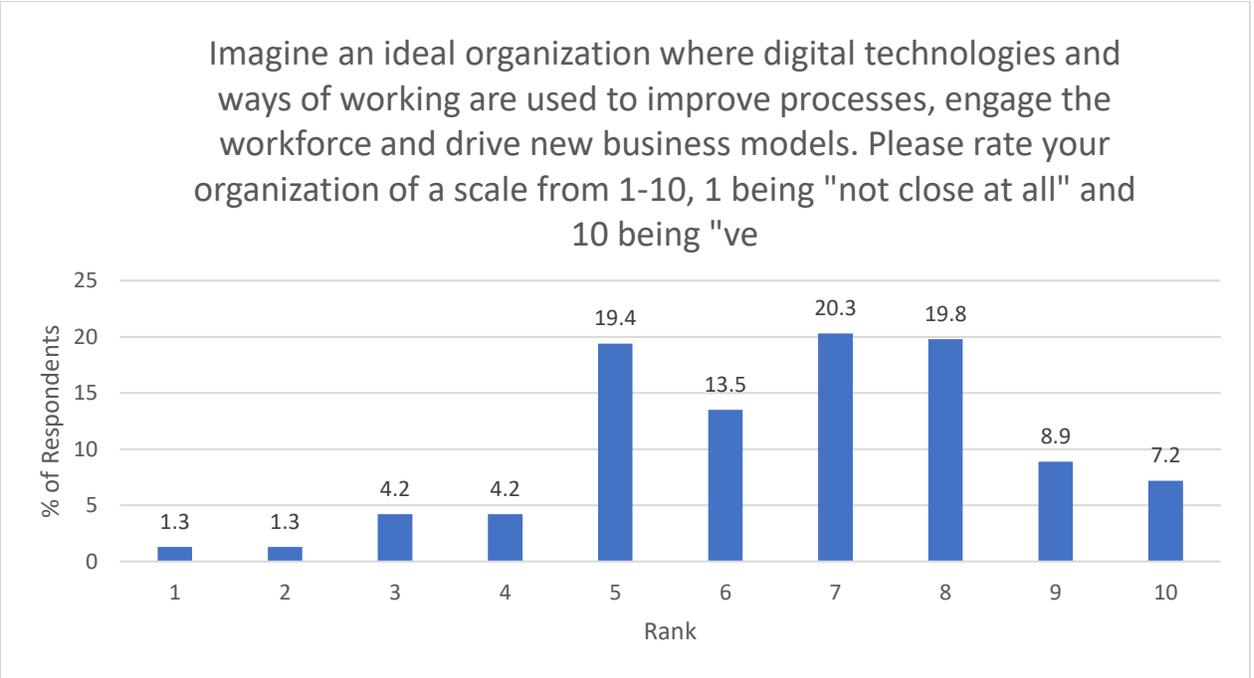


Figure (D4). Nashville Area Chamber Member Survey

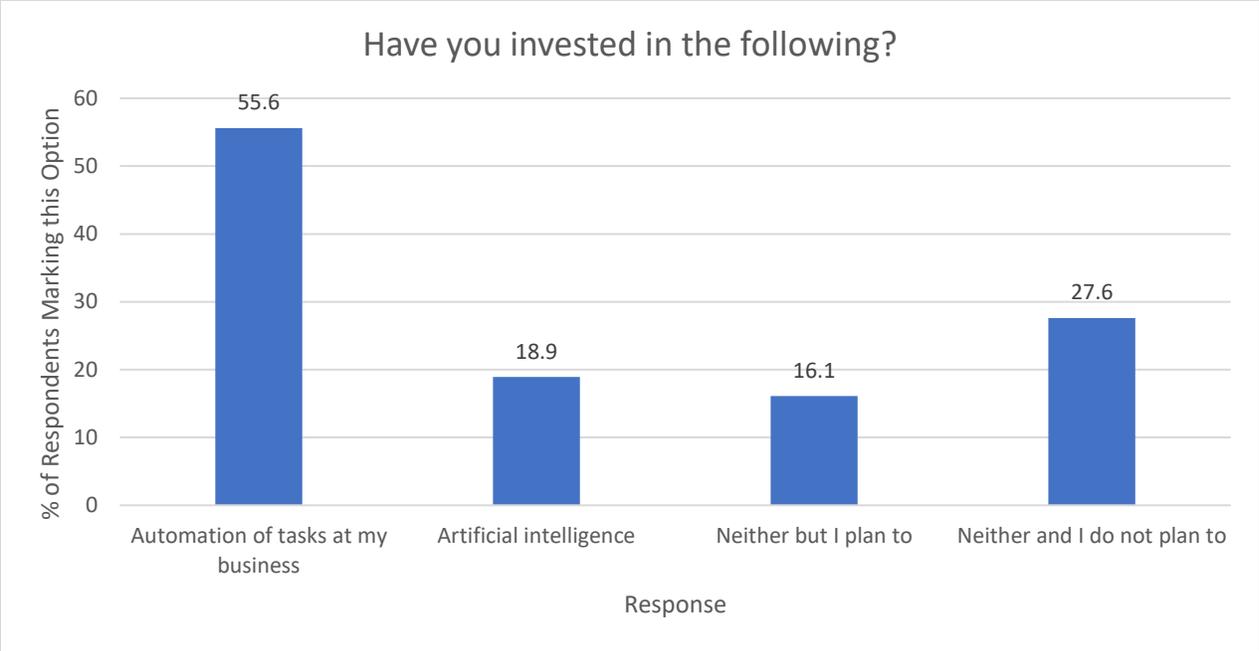


Figure (D5). Nashville Area Chamber Member Survey, Respondents were told to check all that apply, and given the following information: Examples of automation include using tablets as restaurant ordering devices and robotics taking over manufacturing tasks. Examples of artificial intelligence include utilizing robotic financial advisors or online customer service bots

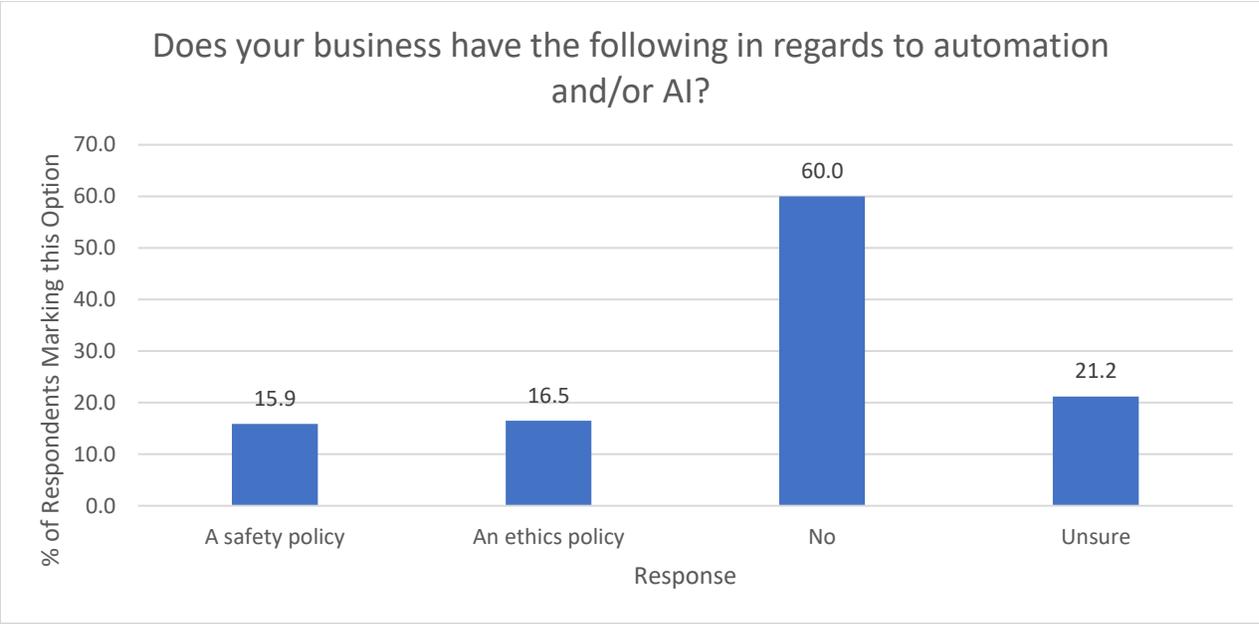


Figure (D6). Nashville Area Chamber Member Survey, Respondents were told to check all that apply, and given the following information: An example of a safety policy would be ensuring that controls initiating power or motion are guarded against accidental operation. An example of an ethics policy would be notifying customers that they are talking to a bot instead of a human.

Those who answered that they did have a safety policy gave some of the following examples: virtual security systems, ongoing safety training that is mandatory for all staff and human machine interfaces ensuring machine management safety. Those that indicated they have an ethics policy gave some of the following examples: stipulations on how digital information is gathered and used, labeling automated messages so that customers are aware when they are not talking to a human, and required annual ethics training at an organizational level.

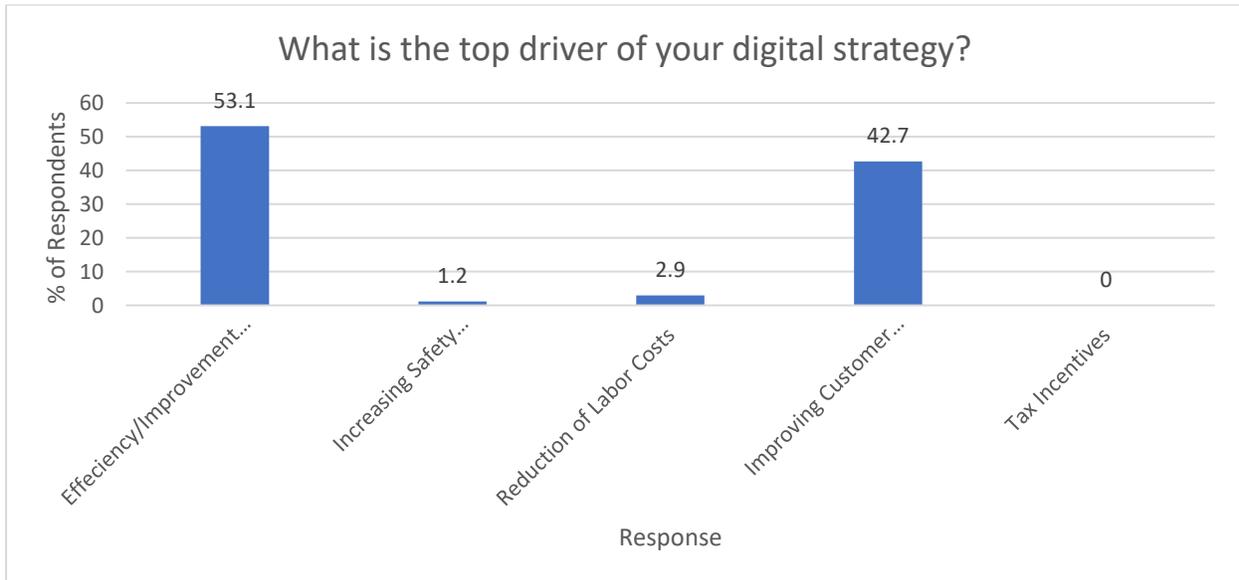


Figure (D7). Nashville Area Chamber Member Survey

**Automation, AI, and Recovery**

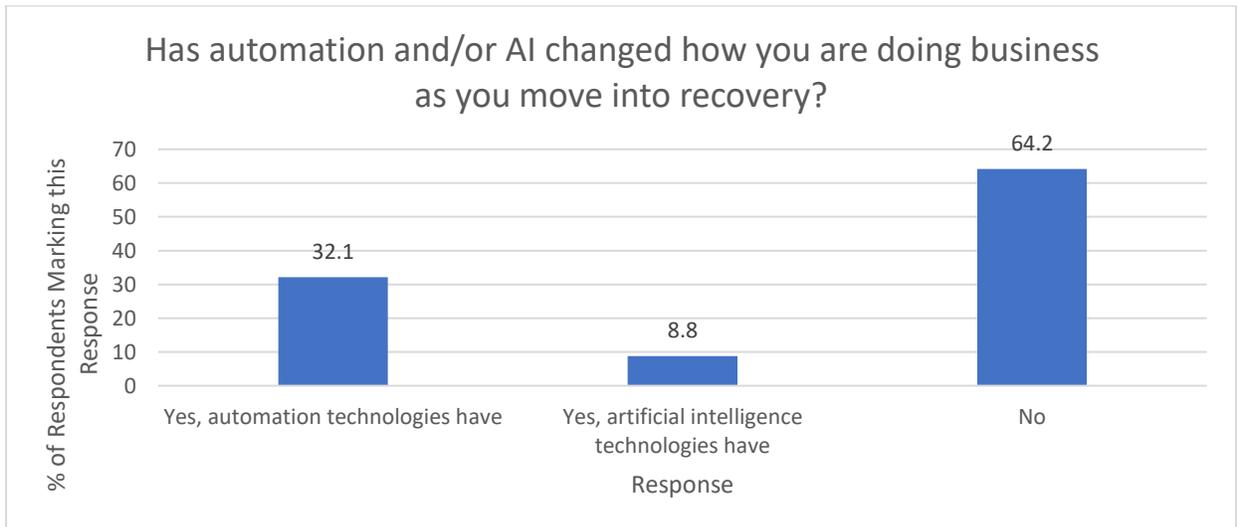


Figure (D8). Nashville Area Chamber Member Survey

Those that responded that automation and/or AI has changed how they are doing business as they move into recovery were then asked how. Many responses indicated that they have moved much more capacity online in terms of document handling and meetings, and that this is not likely to revert 100% to

pre-COVID-19 methods once the pandemic has ended. Many service-based businesses indicated that they had moved to completely touchless guest experiences and more mobile-device interaction. Others indicated an increased concentration on utilizing business analytics of their customer bases to forecast into the future. Some have switched their reception or other communication and scheduling functionality to AI. Still others indicated that while they may expect to downsize, implementation of automation for certain tasks will be so that the business is able to keep salaries high for remaining employees.

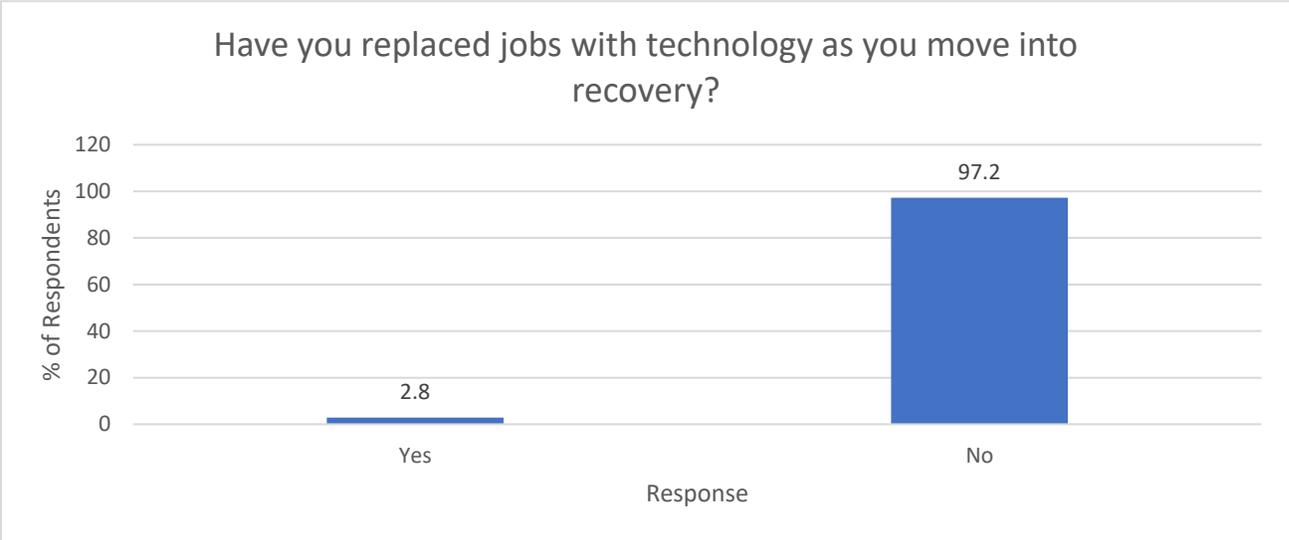


Figure (D9). Nashville Area Chamber Member Survey

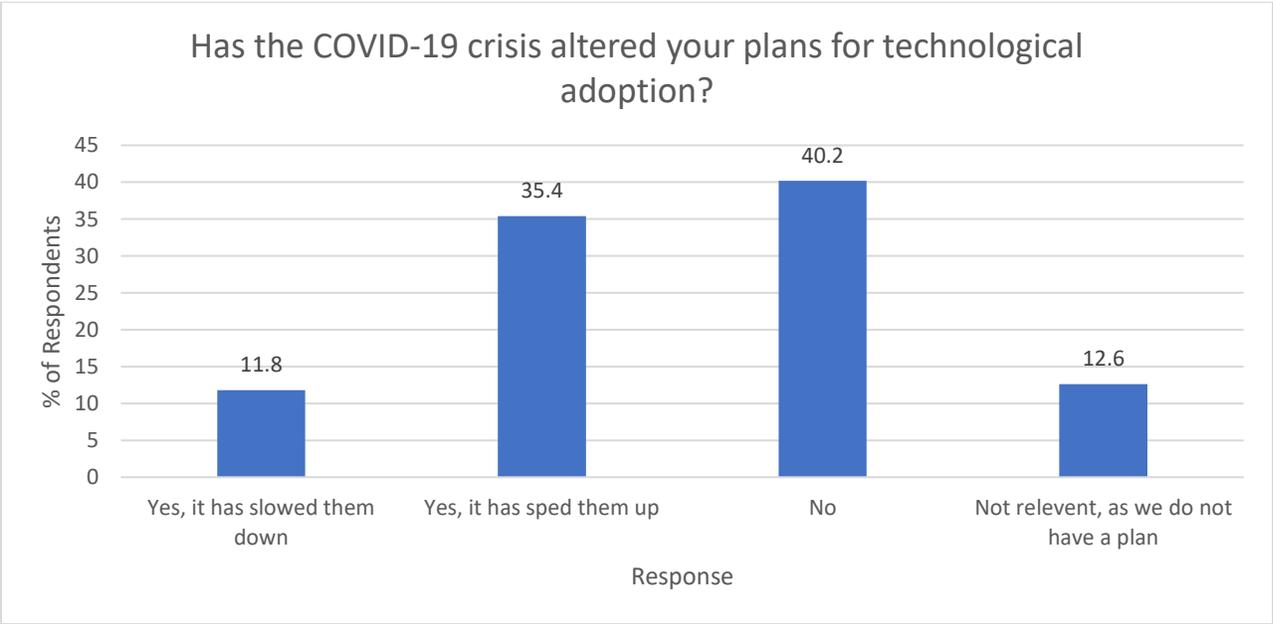


Figure (D10). Nashville Area Chamber Member Survey

The graph above shows that approximately 35% of Chamber member organizations indicated that the COVID-19 crisis has sped up their organization’s plans for technological adoption. Only 12% have

indicated that the crisis has slowed these plans down, while 40% indicate that the crisis has not affected their plans.

**Education, Automation and Alignment**

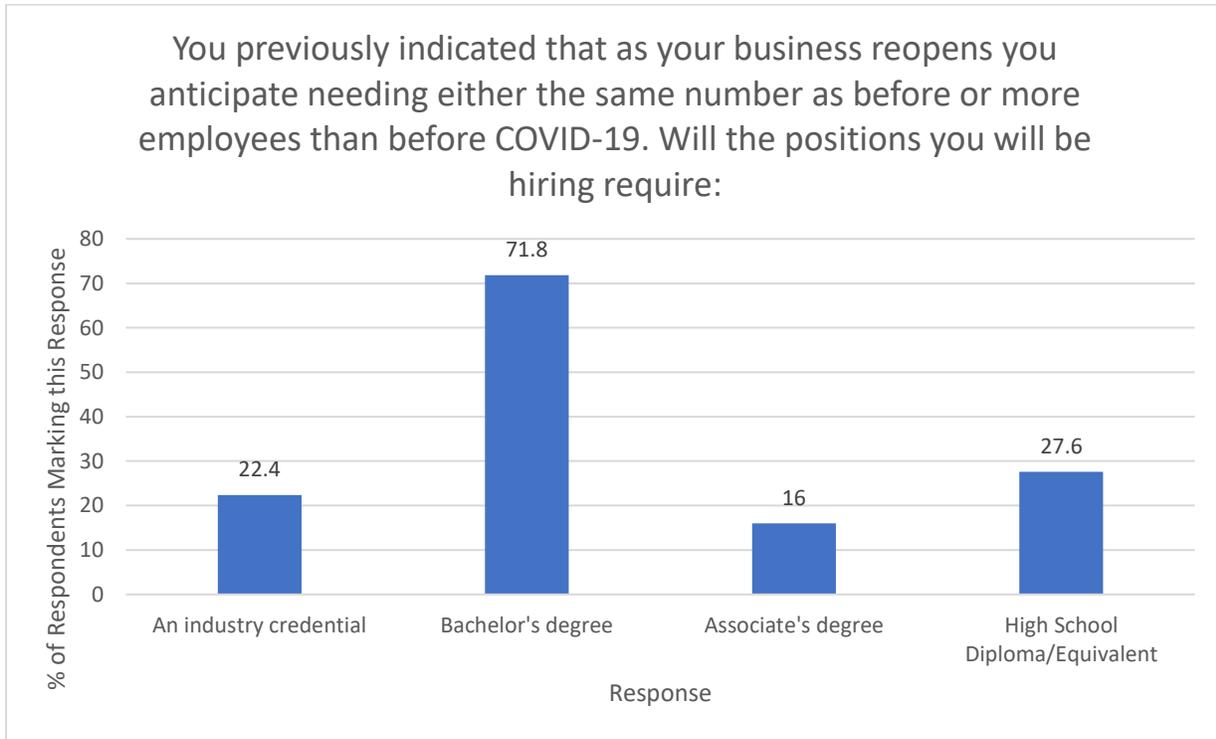


Figure (D11). Nashville Area Chamber Member Survey

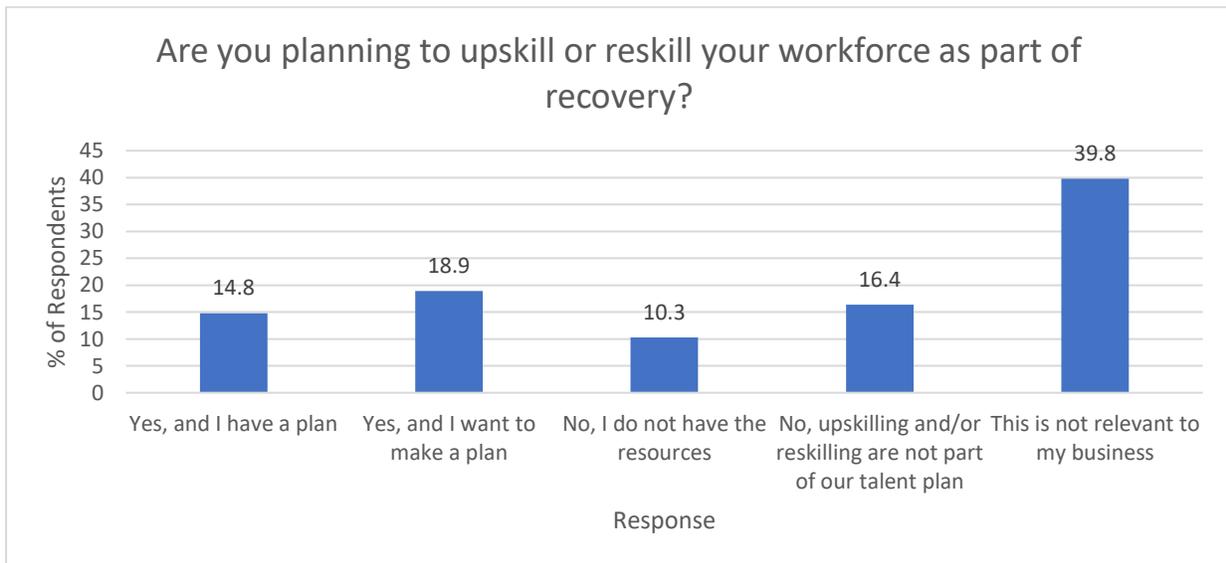


Figure (D12). Nashville Area Chamber Member Survey

Currently, approximately 40% of member organizations state that upskilling or reskilling is not relevant to their business. Interestingly, approximately 20% of businesses plan to upskill or reskill their present

workforce as a part of recovery, but do not yet have a plan. It is important to note this an opportunity for the AJC and local workforce board to work on employer outreach across the Nashville and Clarksville MSAs. This shows most employers do not know about the upskilling and reskilling resources, or their connection to trained talent through Jobs4TN.

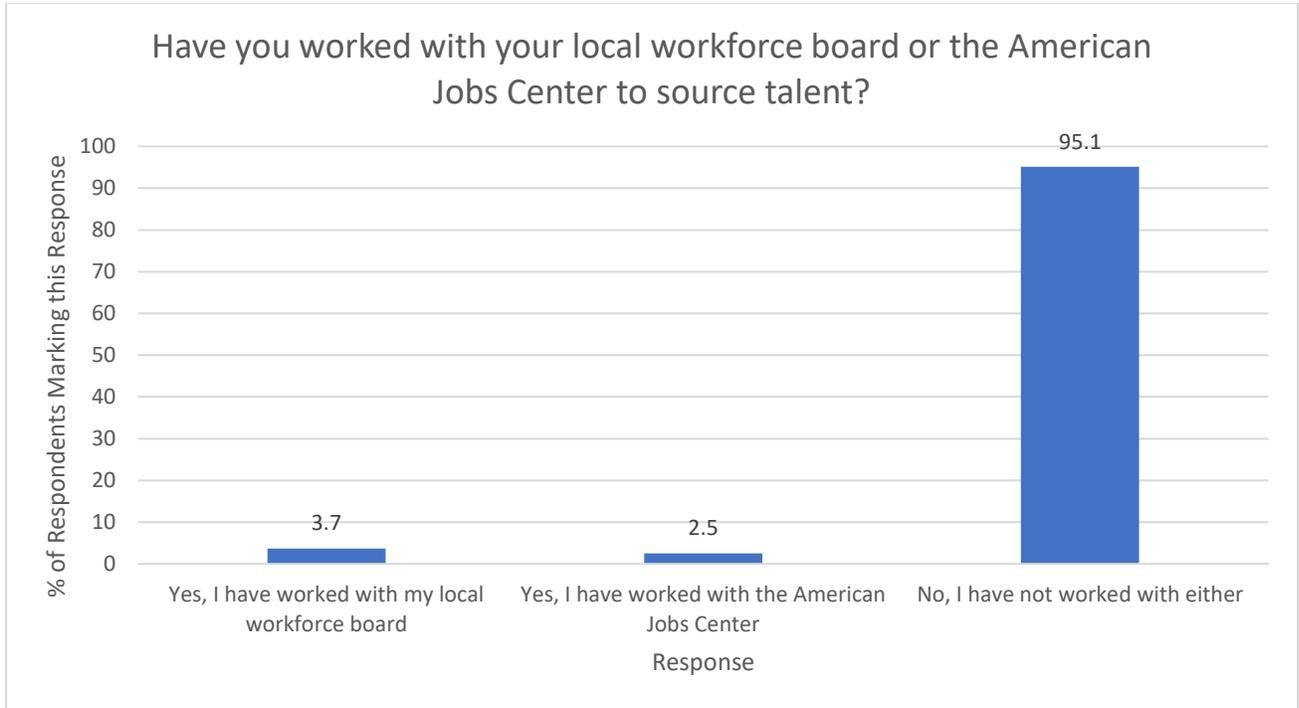


Figure (D13). Nashville Area Chamber Member Survey

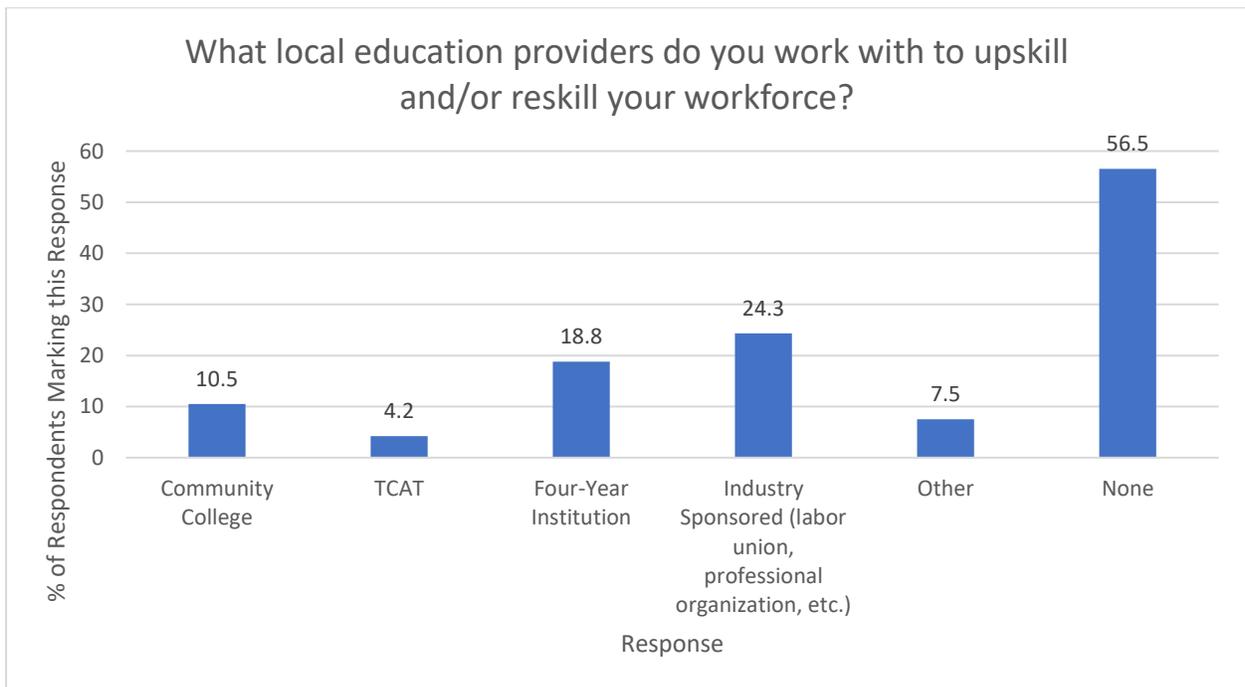


Figure (D14). Nashville Area Chamber Member Survey

## **Pipeline Information**

These graphics are highlighting all of the CTE programs offered in the high schools in the Nashville region (), as well as all of the degrees and programs offered at community colleges and TCATs in the Nashville region.

[https://nashvillechamber1.sharepoint.com/sites/Chambers/Policy/Shared%20Documents/Research%20Media/5.%20WORKFORCE%20STUDY%202019/WF%20Development%20Matrix/Career%20Clusters-WFS%20\(1\).pdf](https://nashvillechamber1.sharepoint.com/sites/Chambers/Policy/Shared%20Documents/Research%20Media/5.%20WORKFORCE%20STUDY%202019/WF%20Development%20Matrix/Career%20Clusters-WFS%20(1).pdf)

## **Best Practice Profiles**

Below are short profiles on some example best practice workforce pipeline programs in Nashville and the surrounding region. All the programs below highlight unique partnerships in diverse industries and innovative solutions to connecting Middle Tennessee talent to promising jobs. Interviews were conducted with representatives from each of the programs, and when applicable site visits were made to see the programs in action.

### Best Practice Profiles- Apprenti

#### *The Need*

The Greater Nashville Technology Council serves as the leading voice and advocate for Middle Tennessee's \$7.5 billion information technology ecosystem; and the over 50,000 technology professionals who design, implement, and safeguard the technology that powers the region. They are in place to strengthen and advance the technology sector in Middle Tennessee by bringing together key stakeholders to create opportunity and growth. Through various focus groups and conversations facilitated by the Tech Council with technology employers in the region it became apparent that there was a growing need for an accelerated technology boot camp of sorts to fit the region's growing need for high-quality tech talent. However, once students were trained there was still a learning curve when it came to employment readiness. Thus, the Greater Nashville Tech Council sought to create an apprenticeship program that combined classroom training alongside work-based learning in partnership with major employers in the region. Ultimately creating a direct pipeline for those people seeking to enter tech careers to fill the high-need tech jobs of employers in the region.

#### *The Program*

Apprenti is the first technology-focused apprenticeship program in Tennessee and is unlike other traditional internships or job training options. Apprenti combines paid on-the-job training and education with placement in high skilled, salary-competitive occupations. The Greater Nashville Technology Council works with companies in the tech industry to identify mid-tier jobs ready to be filled by highly competent people, regardless of their educational background. The Greater Nashville Technology Council has been intentional in actively recruiting women, minorities, and veterans, groups that are typically underrepresented in tech jobs, but everyone is eligible and encouraged to apply. The Apprenti program currently is a pipeline towards careers in these fields: network security, software development, web development and system administration.

### *What they do?*

The program begins when interested applicants take an online assessment. The assessment is used to assess aptitude for a tech career as the typical applicant is someone who has had some professional experience but is looking to move into the tech field. These test results are then screened by the Apprenti team at the Greater Nashville Tech Council, headed up by Chief of Staff Sandi Hoff. Once the cohort has been selected the apprentices go through the employer selection process, and it is important to note that this happens prior to any of the technology classes and training. Students then interview and receive a job offer from one of the partner employers. This is followed by the classroom-training portion of the program through a partnership with Vol State Community College and the Nashville Software School. For the Network Security and System Administration tracts this training lasts 14 weeks, for the Software and Web Development tracts students receive 6 months of classroom-training. After classroom training the apprentices move into the final stage of the official program which is 12 months of on the job training with their pre-selected employer. During the on-the-job training portion, the apprentices start with being paid 60% of market rate and after 6 months move to a market rate salary.

### *How they did it?*

The Greater Nashville Tech Council was able to spearhead the Apprenti program through corporate partnerships and sponsorships, as well as partnering with the Nashville Software School and Vol State Community College to complete the classroom portion. They also applied for and received a state-funding grant. From there the program evolved and continues to evolve as their first cohort of 15 apprentices moves into being full-time employees and the second cohort begins at the start of 2020.

### *Models and Spin-Offs*

While the initial spark for the creation of Apprenti came out of conversations between the Technology Council and regional employers with tech functions, the Technology Council was fortunate enough to identify a model with a partner in Seattle around the same time. The Washington Technology Association has a similar program that had recently launched, and the Greater Nashville Technology Council was able to collaborate with them to help build out the Apprenti program here in Middle Tennessee. There are now 12 similar Apprenti programs around the country from Seattle, Washington, to Cincinnati, Ohio, to the state of Louisiana.

### *Benefits*

Sandi Hoff described how a big goal for the Tech Council in creating this program was to change the conversation around hiring tech talent. Within the tech community in Middle Tennessee there is a lot of talk about how employers were struggling to find talent to fit their needs. Apprenti, while not the only solution, is an important piece in building out more options and pathways to connect people interested in the tech industry to training and then good jobs. The Tech Council is in a unique position: in addition to having strong relationships within the corporate tech community, they are also able to weigh heavily what makes sense for employers in hiring tech talent and what needs they may have in an apprenticeship program as well. In the end, Apprenti can bridge those people looking to break into the tech industry with state-of-the-art training as well as provide them with jobs, while filling in the manpower strain that tech companies in the area are feeling.

Sources: <https://apprenticareers.org/locations/tennessee/>; <https://technologycouncil.com/apprentitn/>;  
Interview with Sandi Hoff, Chief of Staff, Greater Nashville Technology Council

## Best Practice Profiles- Tractor Supply IT Partnership with NSCC

### *The Need*

It all started when Rob Tudor, now director of IT Partnerships at Nashville State Community College, left his IT job at Tractor Supply Company in the spring of 2018 to come to Nashville State. Around the end of that same year Rob started having serious conversations with directors at Tractor Supply and Nashville State about how the two could build a working public-private partnership. Rob wanted to find a way to get his graduating IT students funneled into Tractor Supply's present and growing need for IT talent. It was in these meetings that the two entities sought to find a way to bring Tractor Supply's internship work to the students at Nashville State, and have the resources and work space at the school, since eliminating transportation barriers for the future student workers was a big priority. It was from here that the Tractor Supply Learn and Earn Internship Program on the campus of Nashville State came to fruition.

### *The Partnership*

The Tractor Supply Learn and Earn Program on Nashville State Community College's campus is a semester long internship for Nashville State students located on the school's campus but providing real tech solutions to Tractor Supply and their retail stores across the country. The program launched in the summer of 2019 with a cohort of 5 student interns. The program is unique in that it provides students the opportunity to work and be paid in an internship for a reputable company while continuing to be on campus and take classes towards their degrees. The students have then been able provide extremely valuable networking and programming work to meet Tractor Supply's IT needs.

### *What they do?*

The timeline for the students to complete the body of work laid out by Tractor supply coincides with Nashville State's school semesters. The students first apply to the program as you would to any internship, and then move through an interview process with Tractor Supply. The pilot program and the subsequent cohorts have all ended up having between 4 and 5 students. The project focus of the pilot program was networking with the subsequent two cohorts focusing more on programming with a focus in automation. After the students have been selected, they have a one week orientation with the Tractor Supply supervisors in their workspace on campus, which typically follows with a 6 week training course to prepare students for the work they will focus on completing for the rest of the semester. Students also have the opportunity to do a day in the life at Tractor Supply's corporate offices in Brentwood, TN. Here they have the chance to meet with company leadership and present the work they are doing back at Nashville State. In the most recent cohort students also had the chance to experience a day in the life at a Tractor Supply retail store and see firsthand what the IT support systems they are building look like in action. At the end of the semester some students have been able to continue to work for tractor supply if their schedule allows, while others return to taking full course loads, but with new invaluable work experience and knowledge.

### *How they did it?*

To initially build out the program, Nashville State made a capital investment in building an on-campus working space for the students and their Tractor Supply supervisor. The funding was sought and approved by the school's president and Tennessee Board of Regents. From here Nashville state converted an old classroom into a mini IT office space complete with cubicles and co-working spaces, with specific IT cabling and enhanced WIFI capabilities. Tractor Supply then brought in all the necessary technology (laptops, monitors, etc.) for the interns to carry out their work. From there Tractor Supply planned and laid out the body of work for the students to finish in their 15-week semester with a presentation at the end to demonstrate the results of their assigned projects.

### *Models*

There were not any existing models that informed the work of Nashville State and Tractor Supply.

### *Benefits*

The benefits for the students of Nashville State are that students can work on campus while continuing to earn their degrees. The program addresses transportation barriers for work and school. Students gain hands-on technical knowledge from Tractor Supply supervisors and corporate real-world experience through special program days on site at Tractor Supply offices and retail stores. Finally, students can receive a Capstone credit for their internship, something that is necessary for graduation.

Source: Interview with Rob Tudor, Director of IT Partnerships at Nashville State Community College

## Best Practice Profiles- Nashville Career Readiness Partnership Construction Program

### *The Need*

Nashville's construction industry is booming because of Nashville's status as a destination city to visit, move to and work in over the past decade or so. A challenge has been for the city to connect companies that are hiring in the construction industry to qualified job candidates. Davidson County residents are eager for jobs to go to local candidates, and in order to hire local talent for construction, employers need to be able to readily find and hire qualified candidates. The Nashville Construction Readiness Partnership was started to address this challenge. In its first year, it provided residents with necessary training in addition to connecting qualified candidates with potential employers (and vice versa). There was also special care taken in providing jobs and career pathways to Davidson County's low-and middle-income residents that otherwise would have been inaccessible.

### *The Partnership*

At the start of the Construction Readiness Partnership in 2017, the Mayor of Nashville at the time, Megan Berry, wanted to focus the training resources in Promise Zones. Promise Zones are high poverty communities where the federal government partners with local leaders to increase economic activity, improve educational opportunities, leverage private investment, reduce violent crime, enhance public health, and address other priorities identified by the community<sup>1</sup>.

-The mayor's office put out an RFP asking for community organizations to bid on hosting training programs. The two community organizations that were then chosen were Goodwill, which was already doing a similar construction program but this allowed them to scale it to reach more people, and Project Return, an organization that works on helping people returning to the community after incarceration. Now both Goodwill and Project Return are receiving funding from the Mayor's office to provide construction training, as well as being connected with construction employers to make the pathway to a job even more seamless. These community partners have allowed for enhanced program awareness, especially amongst lower income and unemployed residents, while also allowing for the Mayor's office to assist area employers with filling their workforce needs.

#### *What they do?*

Goodwill and Project Return put on the actual construction training. At each of these agencies, candidates receive a 6-week hands-on training. Goodwill also offers a stipend for people while in the training. Candidates all graduate with an industry recognized NCCER (National Center for Construction and Education Research) credential, as well as receive training in important soft skills applicable to any job. Goodwill has also had the opportunity to partner with the Tennessee Valley Authority and received a grant from Green Jobs to provide an additional weatherization credential for people going through the program.

Construction employers are invited to engage with the training providers and attend graduations where they have access to interested job candidates. The Nashville Career Advancement Center is the Metro Nashville Agency operating in partnership with the employers, community agencies, training providers and Nashville's job seekers to connect through the Nashville Career Readiness Partnership, and are a central point of contact for employers looking to fill job positions. This central point of contact has been imperative in making the pathway to employment as easy as possible for both those being trained and employers.

#### *Benefits and Spin-offs*

After the first two years of the Construction Readiness Partnership over 200 Davidson County residents had been successfully enrolled in construction training programs. Of that group 90% have successfully landed jobs. For the second year of the Public Investment Plan, the "C" in the name was changed from construction to career to broaden the program's reach to additional high-need industries in Davidson County: Hospitality and Healthcare. The benefit of what is now the "Career Readiness Partnership" is that it bridges the gap between skilled workers and companies with open positions. This benefits those looking for skills training to find a job, or like the people that Project Return's construction training serves: those looking to find a job after incarceration. This also benefits employers in the region as well as the various low- and middle-income communities where trainings are located. This partnership truly helps to create job pathways that could otherwise be inaccessible.

Source: <https://www.nashville.gov/Metro-Action-Commission/Nashville-Career-Advancement-Center/Nashville-Career-Readiness-Partnership.aspx>, Interview with Tanya Evrenson, Director of Adult Strategy at the Nashville Career Advancement Center; <https://www.hudexchange.info/programs/promise-zones/promise-zones-overview/>

## Best Practice Profiles-Nissan/TCAT Murfreesboro

### *The Need*

Dan Caldwell, Senior Manager of Learning Pathways at Nissan North America describes a trend that was present in the early 2000s towards 4-year colleges and universities as the primary viable path after high school. This trend took hold, and created a workforce gap, a lack of workers with trade or technical skills like industrial maintenance and machining. In 2015 these middle-skill jobs accounted for 53% of the U.S. labor market, but only 43% of the country's workers held the skills to fill these jobs. This directly affected the Middle Tennessee region, placing a strain on the highest-producing manufacturing plant for Nissan North America in Smyrna. In 2012 Nissan went through a large expansion, releasing 5 new or updated model cars as well as adding a new afternoon production shift. To meet their need Nissan had to make more mid-career hires, further creating a strain in the middle-skill market as many of their suppliers in the area also relied on middle-skilled workers.

To bridge this skills gap the public-private partnership between the Tennessee College of Applied Technology of Murfreesboro and Nissan North America was born.

### *The Partnership*

In January of 2017, TCAT-Murfreesboro and Nissan North America began accepting its first students at the newly constructed Smyrna Campus and Nissan Training Center. The technical training center is shared by the college and Nissan, highlighting a public-private partnership between Nissan and the College System of Tennessee to create educational opportunities that are closely aligned to current workforce needs in the region. The campus offers programs to prepare students and Nissan employees for careers in advanced manufacturing and related fields, training, and upskilling them in those high demand middle skills.

### *What they do?*

The education and training facility houses both public TCAT students as well as current employees from the Nissan Smyrna Plant. On the TCAT side, students can take classes in fields such as Automotive Technology, Collision Repair Technology, Industrial Electrical Maintenance/Mechatronics, Machine Tool Technology, and Welding Technology. Current Nissan workers as well as the TCAT students learn valuable skills that can be directly applied in Nissan's facilities or with other employees in the Middle Tennessee region.

### *How they did it:*

The Governor at the time, Bill Haslam, proposed the joint-use training facility in his 2013 State of the State address and the Tennessee General Assembly approved a \$35.4 million appropriation in the 2013-2014 state budget. Nissan is paying \$1.9 million through a lease agreement. The balance of the funding for the state-of-the-art training equipment came through internal Tennessee Board of Regents funding, grants from state and federal agencies, and donations from Nissan and its vendors.

### *Models:*

At the onset of the project, Nissan looked at the public-private partnerships already in place between Toyota and Bluegrass Community and Technical College in Kentucky as well as between Eastman Chemical and Northeast State in Kingsport, Tennessee. These served as jumping off points to create a public-private technical education partnership unlike any other in the state of Tennessee.

*Benefits:*

Caldwell described the benefits of the public-private partnership as 5-fold. First, the students win. They get to take classes at a state-of-the-art training facility and use top of the line equipment.

Second, TCAT wins. In addition to, Nissan's initial capital investment to open the facility, they also secured \$1.5 million in state-of-the-art equipment contributed by 20 separate Nissan vendors, which technical schools are usually on long waiting lists to receive.

Third, Nissan wins. As a private corporation Nissan is not able to accept donated equipment, but the TCAT is. Thus, Nissan is only able through this partnership to use this equipment for their own continuing education efforts for their employees.

Fourth, the vendors win. Down the road when these TCAT graduates are purchasers for whatever company they work for they will think back on these vendors they are familiar with and will likely choose their products to invest in.

Finally, the community wins. The state-of-the-art training facility also houses a large conference space and is open to the public to use. For example, the Junior Achievement STEM summit has been hosted at the training facility the past two years.

While the facility is home to Nissan's programs for its employees and potential employees, the TCAT Smyrna campus is open to any student interested in careers in its course offerings. Through the Tennessee Promise Program, students who graduate from high school in 2015 or later may attend tuition-free.

This facility highlights Nissan's and the State of Tennessee's investment in developing and maintaining a highly skilled workforce in Middle Tennessee.

**Sources: Interview with Dan Caldwell, Nissan/Tennessee Board of Regents Press Release (March 31, 2017), Smyrna Campus and Nissan Training Center homepage (<https://tcatmurfreesboro.edu/business-industry/smyrna-campus-and-nissan-training-center>)**

### **Student Survey**

In March and April of 2020, the Nashville Area Chamber asked students across the Nashville and Clarksville MSAs a series of questions about employment status, school experience, goals, and expectations faced balancing a schedule as an adult student. This survey had approximately 400 respondents. Distribution partners include Nashville State Community College, Columbia State Community College, Volunteer State Community College, and various TCAT locations (Tennessee College of Applied Technology) across the MSAs. before and during the beginning of the Metro Nashville – Davidson County and then State of Tennessee COVID-19 shutdowns.

While the entirety of the survey results can be found in Appendix S, find below a collection of high-level results:

The top three fields of study, health science, business management & administration or finance, and information technology, 32%, 20%, and 9% of all respondents, correspond to previously identified focus sectors for the region.

- 21% of respondents participate in work-based learning (apprenticeships, or structured learning at a workplace), and 81% of these respondents indicated that this is through their school
- 45% of respondents indicated that they are pursuing a 2-year associate degree, 20% indicated that they are pursuing a certificate, and 26% indicated that they are pursuing a bachelor's degree
- 68% of respondents indicated that they have a job, 16% have more than one job
- Of respondents that indicated they have more than one job, 77% reported that this is because of cost of living
- 15% of respondents indicated that childcare makes their schedules difficult, and the primary issue here was cost
- 12% of respondents indicated that transportation makes their schedules difficult, and the primary issue here was commute time
- 15% of all respondents indicated that they do not have health insurance
- 82% of respondents with a job indicated that they are paid hourly, and 57% of hourly employees indicated that they make less than \$15 per hour
- 60% of respondents indicated that they plan on remaining in the Nashville region after graduation

### **Barriers to Work**

Each of the next three topics could be standalone studies, addressing how barriers like childcare, transportation, and housing impact workers in the region. As evidenced by the student study, these topics are part of the equation when discussing the regional workforce and how workers can access training, education, and good jobs. Additionally, each of these three topics has significance both seen outside of and through the lens of COVID-19.

#### **Childcare**

Access to childcare has been a topic of much discussion and concern in recent years at a national level as well as a local level. The issues with childcare mainly revolve around access, cost, and quality of care, but it also is extremely important to look at the way childcare affects the workforce and thus the Middle Tennessee regional economy. Ultimately, high-quality, affordable childcare for all is good for families, communities, and the economy.

It helps the economy when women work, research shows<sup>27</sup>, and it is often beneficial for their families as well, especially when half of Tennessee families depend on a female breadwinner<sup>28</sup>. Significant evidence also demonstrates that when there's high quality, affordable and readily accessible childcare, more women work. According to Think Tennessee's State of our State: Women in the Workforce report, there is a 13-percentage point gap in labor force participation between men and women in the state of Tennessee<sup>29</sup>. Expanding access also simply better allows families to realize their full economic potential as well foster economic growth and prosperity.

One initiative that is currently doing work to support and grow the existing early childhood education system in Nashville is called the Blueprint for Early Childhood Success. While the Blueprint's focus is grounded in creating a citywide framework for literacy, it is recognized that without early intervention to meet critical milestones this goal cannot be achieved. Thus, a roadmap was also created to strengthen preschools and early learning opportunities. While the roadmap has made great strides to chart a path forward to strengthen Nashville's early childhood education network, there is still much more work to be done, especially when it comes to surrounding counties, and creating better opportunities for the early childhood education workforce.

There are three major economic benefits of high-quality, affordable childcare. The first is a more productive workforce. This is especially true nowadays as many have had to pivot to work from home due to COVID-19. Parents that have access to reliable and affordable childcare are able to be more productive and less absent at work. Secondly, childcare supports the direct and indirect jobs of many, such as early education workers and student parents. Finally, childcare means better earnings for workers and higher labor force participation. Childcare centers provide vital infrastructure to allow parents to hold jobs outside of their homes, which often means a higher salary and a clearer pathway to promotions and pay raises.

### **Housing and Transportation**

Housing and transportation are critical to Middle Tennessee's quality of life. The Research Center considered both issues as they relate to workforce, including the impact of COVID-19 on efforts to improve housing and transportation quality and access.

A common housing metric is cost burden. A household or individual is considered cost burdened if they spend 30 percent or more of their take-home pay on housing. Data from the economic region shows disparities when broken out by race, ethnicity, ownership status and educational attainment.

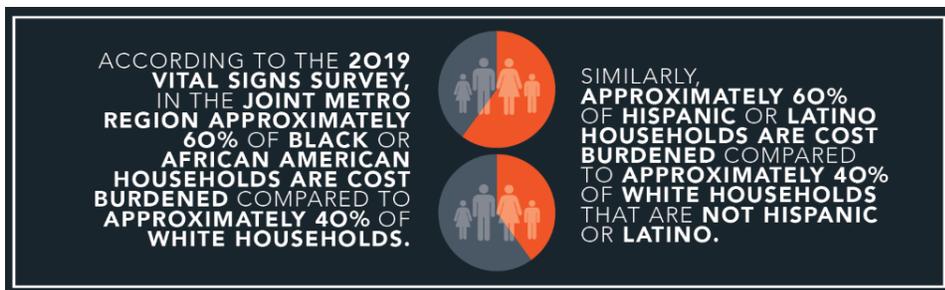
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<sup>27</sup>

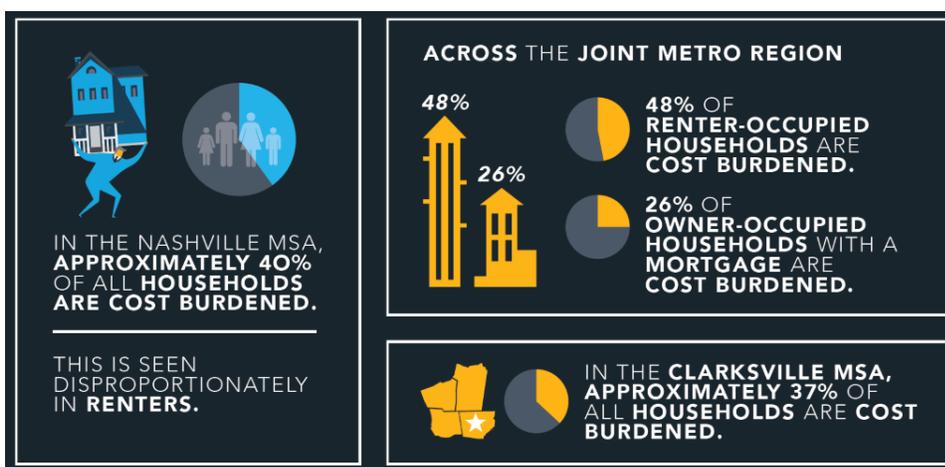
The National Bureau of Economic Research, Changing Business Cycles: The Role of Women's Employment, March 2019

<sup>28</sup> A Better Balance, State of our State: Women in the Workforce, 2019

<sup>29</sup> Science Magazine, Early Childhood Investments Substantially Boost Adult Health, March 2014



This housing and transportation data represents a period before COVID-19’s impact on Middle Tennessee. More households have become cost burdened as individuals have lost employment, been furloughed or experienced reduced income. As eviction moratoriums end, the effects of the economic downturn will become more severe.



While cost burden related to housing has been negatively impacted by COVID-19, Middle Tennesseans who commute to work are experiencing far less traffic on the roads than is typical. In 2018 in the Nashville MSA, approximately 20 percent of daily commuters experienced a commute of over 45 minutes.

Over the last five years, remote working has been on the rise, particularly in the Nashville MSA, increasing from approximately 4 percent to 6 percent of the labor force. With the sudden impact of COVID-19, many organizations have been forced to suddenly turn to remote work and are now fine-tuning their remote work policies with indications that remote working will become an ever-increasing trend for years to come.

## Conclusion

The data regarding key occupations required by our target industries and the skills and occupation gaps that exist currently, point to five key occupational groups for workforce development efforts. These focus areas are **healthcare practitioners and technical occupations, computer and mathematical occupations, business and financial occupations, management occupations and production occupations for advanced manufacturing**. Workforce efforts should focus heavily on the healthcare,

business services, information technology, and advanced manufacturing sectors in terms of these occupations. The appendix contains detailed occupational break outs inclusive of educational, wage, automation and COVID-19 indices, and demographic information.

PLACEHOLDER FOR OCCUPATIONAL  
INFOGRAPHIC

The projected deficits in skilled workforce will continue to broaden over the next five years, exasperated by the economic conditions created by COVID-19, instability in global economies, attrition due to an aging labor force, and disruption from technology. Preparing students and retooling and upskilling adult workers can ensure these critical target sectors are well supplied with the qualified workforce necessary that they need to grow and sustain competitiveness. At the same time, talent development can help ensure that more residents can compete for good and promising jobs and benefit from growing prosperity in the region.

This study is intended to inform and serve differing stakeholders from workforce and economic development professionals, industry decision makers, policy makers to regional leadership with economic data that translates into concrete and intentional recommendations. Recommendations to make the economic region stronger through empirically based practices that will align industry needs with workforce development programs in a tailored manner that also aligns workforce programs with workforce needs.

### **Tactical Recommendations:**

#### **Economic Development Professionals**

- Target Advanced Manufacturing [with attention to Production Technology & Medical Device Manufacturing], Healthcare Industries, Business Services, and Information Technology sectors when targeting employers to relocate to the region.
- Utilize out-commuter data to strategize on what industry would fit the skillsets of workers in counties that currently have high rates of the labor force commuting out for work.
- Provide support to existing industries to increase targeted use of automation, AI, & production technology as means to limit disruption and increase emergency preparedness.
- Provide support to existing industries to increase awareness of complementary supply services that offer the development of secondary operations (for example a metals manufacturing supplier for automotive could consider a secondary line of supply to other industries requiring metal fabrication such as a medical device manufacturer).
- Provide support to existing industries in assessing the digital readiness of workers. This means determining the skill tiers of workers in the target industries:
  - Base Zero: Do not know how to use any form of technology (i.e. cell phones, computers, email, etc.) at home or work.
  - Base One: Basic knowledge of cell phones, computer hardware, machinery and basic software, internet, and work-related machines; limited use at home and work.
  - Base Two: Comfortable knowledge and use of baseline technology, machinery, and software; use at home and work as part of their regular daily personal or occupational routine.

- Base Three: Advanced knowledge and use of technology, machinery, and software utilized both personally and as part of their work (inclusive of industrial machine technology). Limited ability to program and/or code to accomplish tasks.
- Base Four: Expert level knowledge and use of technology, machinery, and software; able to program or code.

#### Workforce Development Professionals

- Utilize workforce shortage data and assessments of skills, aptitudes, and education to upskill the current workforce
- Use assessments of workforce shortage data, skills, and education required to develop upskilled workforce in preparation for automation and other technologies to best position workers for resilience. This means determining the skill tiers of workers in the target occupational areas.
- Provide support to existing industries through partnerships with economic development organizations to assess the digital readiness of workers. This means determining the skill tiers of workers in the target industries:
  - Base Zero: Do not know how to use any form of technology (i.e. cell phones, computers, email, etc.) at home or work.
  - Base One: Basic knowledge of cell phones, computer hardware, machinery and basic software, internet, and work-related machines; limited use at home and work.
  - Base Two: Comfortable knowledge and use of baseline technology, machinery, and software; use at home and work as part of their regular daily personal or occupational routine.
  - Base Three: Advanced knowledge and use of technology, machinery, and software utilized both personally and as part of their work (inclusive of industrial machine technology). Limited ability to program and/or code to accomplish tasks.
  - Base Four: Expert level knowledge and use of technology, machinery, and software; able to program or code.
- Focus areas:
  - Healthcare occupations: nursing (with pathways from CNA/Tech to LPN, RN, BSN & NP), therapists (i.e. respiratory, physical, occupational), and lab technicians.
  - Information Technology: (hardware/network setup, network systems security, software coding, informatics, and data science).
  - Business/Corporate Services: (management, analysts—financial and business informatics, accounting, and auditing, paralegal/legal administrative [for the next 48 months there will be surplus of legal administrative staff]).
  - A niche opportunity also exists to facilitate the development of advanced software developers, data scientists, statisticians, mathematicians, and actuaries by creating pathways from high school to terminal degree and professional certification through incremental micro-credentials.
- Develop stackable, micro-credentials aligned to target industries and occupations
  - Consider both horizontal and vertical stacking.
    - An example of vertical stacking is transitioning a Certified Nurse Assistant to a Licensed Practical Nurse to a Registered Nurse.
    - An example of horizontal stacking would be taking a machine tool operator who is functional in machining metals to working on plastics.

- Develop secondary skills pathway inclusive of both complementary skills & upskilling
- Target entry-level workforce to bring them to middle skill in both their industry and complementary industries, prepare them to upskill for automation.
- Focus training on occupations that provide opportunity jobs wherein individuals with less than a bachelor’s degree can make at least the regional median wage and have benefits.
- Develop a plan to identify and address barriers to employment that are often also barriers to education and workforce development.

### **Employers**

- Proactively incorporate plans to upskill or reskill the current workforce to meet the needs of a changing economy.
- Engage and partner with workforce and economic development professionals to facilitate the development of systemic programing.
- As automation of tasks becomes more commonplace, employers must develop plans for upskilling and/or reskilling their present workforce with skills and short-term, stackable educational training opportunities that will
  - ensure continuity of business productivity and services,
  - enable progression of skills and employment stability for their workforce.

### **Employers, Workforce & Economic Development Professionals, & Regional Leaders**

- Understanding how technology affects an organization and the region is key in planning around its effects. Towards this goal employers, workforce and economic development professionals and regional leaders must establish an understanding of current technology infiltration in the workforce.
- Development of resilient infrastructure that ensures alignment between employers and the region’s training providers and education institutions.

Ultimately, while data informs, partnerships transform. Creating a workforce development plan that includes many partners with the common interest of strengthening workers and workplaces but having differing challenges to the table is important in creating organizational strategies that lead to systemic change.

## **APPENDICES**

### Appendix C.

The following tables utilize the Census Bureau’s Longitudinal Employer-Household Dynamics to break down what share of out-commuters are employed in each respective industry. This is presented for counties with high rates of out-commuters (over 50%), net outflow can be broken down by 2-digit NAICS (Industry) codes:

Cheatham County, TN			
County	Industry	NAICS	% of Net Outflow
Cheatham	Agriculture, Forestry, Fishing and Hunting	11	0.2
Cheatham	Mining, Quarrying, and Oil and Gas Extraction	21	0.2
Cheatham	Utilities	22	0.8
Cheatham	Construction	23	7.5
Cheatham	Manufacturing	31-33	0.0
Cheatham	Wholesale Trade	42	7.1
Cheatham	Retail Trade	44-45	11.0
Cheatham	Transportation and Warehousing	48-49	4.6
Cheatham	Information	51	3.2
Cheatham	Finance and Insurance	52	5.2
Cheatham	Real Estate and Rental and Leasing	53	2.4
Cheatham	Professional, Scientific, and Technical Services	54	8.5
Cheatham	Management of Companies and Enterprises	55	2.6
Cheatham	Administration & Support, Waste Management and Remediation	56	5.7
Cheatham	Educational Services	61	5.2
Cheatham	Health Care and Social Assistance	62	15.9
Cheatham	Arts, Entertainment, and Recreation	71	1.4
Cheatham	Accommodation and Food Services	72	7.8
Cheatham	Other Services (excluding Public Administration)	81	3.4
Cheatham	Public Administration	90	7.1

Figure (T18) 2017 Longitudinal Employer-Household Dynamics

Cannon County, TN			
County	Industry	NAICS	% of Net Outflow
Cannon	Agriculture, Forestry, Fishing and Hunting	11	0.6
Cannon	Mining, Quarrying, and Oil and Gas Extraction	21	0.0

Cannon	Utilities	22	0.9
Cannon	Construction	23	6.1
Cannon	Manufacturing	31-33	23.5
Cannon	Wholesale Trade	42	3.3
Cannon	Retail Trade	44-45	12.0
Cannon	Transportation and Warehousing	48-49	2.8
Cannon	Information	51	1.9
Cannon	Finance and Insurance	52	4.5
Cannon	Real Estate and Rental and Leasing	53	1.4
Cannon	Professional, Scientific, and Technical Services	54	3.8
Cannon	Management of Companies and Enterprises	55	1.1
Cannon	Administration & Support, Waste Management and Remediation	56	8.0
Cannon	Educational Services	61	6.0
Cannon	Health Care and Social Assistance	62	10.7
Cannon	Arts, Entertainment, and Recreation	71	1.1
Cannon	Accommodation and Food Services	72	7.6
Cannon	Other Services (excluding Public Administration)	81	1.8
Cannon	Public Administration	90	2.9

Figure (T19) 2017 Longitudinal Employer-Household Dynamics

Dickson County, TN			
County	Industry	NAICS	% of Net Outflow
Dickson	Agriculture, Forestry, Fishing and Hunting	11	0.1
Dickson	Mining, Quarrying, and Oil and Gas Extraction	21	0.2
Dickson	Utilities	22	0.8
Dickson	Construction	23	12.3
Dickson	Manufacturing	31-33	0.0
Dickson	Wholesale Trade	42	3.4
Dickson	Retail Trade	44-45	7.0

Dickson	Transportation and Warehousing	48-49	7.8
Dickson	Information	51	2.7
Dickson	Finance and Insurance	52	4.6
Dickson	Real Estate and Rental and Leasing	53	2.6
Dickson	Professional, Scientific, and Technical Services	54	11.6
Dickson	Management of Companies and Enterprises	55	3.3
Dickson	Administration & Support, Waste Management and Remediation	56	5.5
Dickson	Educational Services	61	6.4
Dickson	Health Care and Social Assistance	62	9.0
Dickson	Arts, Entertainment, and Recreation	71	2.2
Dickson	Accommodation and Food Services	72	8.2
Dickson	Other Services (excluding Public Administration)	81	3.5
Dickson	Public Administration	90	9.0

Figure (A12) 2017 Longitudinal Employer-Household Dynamics

Macon County, TN			
County	Industry	NAICS	% of Outflow
Macon	Agriculture, Forestry, Fishing and Hunting	11	0.0
Macon	Mining, Quarrying, and Oil and Gas Extraction	21	0.5
Macon	Utilities	22	0.0
Macon	Construction	23	8.2
Macon	Manufacturing	31-33	23.2
Macon	Wholesale Trade	42	2.0
Macon	Retail Trade	44-45	5.6
Macon	Transportation and Warehousing	48-49	11.3
Macon	Information	51	0.6
Macon	Finance and Insurance	52	1.2
Macon	Real Estate and Rental and Leasing	53	1.4

Macon	Professional, Scientific, and Technical Services	54	3.9
Macon	Management of Companies and Enterprises	55	2.0
Macon	Administration & Support, Waste Management and Remediation	56	8.3
Macon	Educational Services	61	2.5
Macon	Health Care and Social Assistance	62	13.7
Macon	Arts, Entertainment, and Recreation	71	1.0
Macon	Accommodation and Food Services	72	8.3
Macon	Other Services (excluding Public Administration)	81	2.6
Macon	Public Administration	90	3.7

Figure (A13) 2017 Longitudinal Employer-Household Dynamics

Maury County, TN			
County	Industry	NAICS	% of Net Outflow
Maury	Agriculture, Forestry, Fishing and Hunting	11	0.3
Maury	Mining, Quarrying, and Oil and Gas Extraction	21	0.2
Maury	Utilities	22	0.2
Maury	Construction	23	7.8
Maury	Manufacturing	31-33	0.0
Maury	Wholesale Trade	42	3.8
Maury	Retail Trade	44-45	18.4
Maury	Transportation and Warehousing	48-49	6.1
Maury	Information	51	2.5
Maury	Finance and Insurance	52	2.5
Maury	Real Estate and Rental and Leasing	53	0.0
Maury	Professional, Scientific, and Technical Services	54	12.2
Maury	Management of Companies and Enterprises	55	4.8
Maury	Administration & Support, Waste	56	11.5

	Management and Remediation		
Maury	Educational Services	61	6.0
Maury	Health Care and Social Assistance	62	6.6
Maury	Arts, Entertainment, and Recreation	71	1.7
Maury	Accommodation and Food Services	72	7.2
Maury	Other Services (excluding Public Administration)	81	3.5
Maury	Public Administration	90	4.7

Figure (A14) 2017 Longitudinal Employer-Household Dynamics

Robertson County, TN			
County	Industry	NAICS	% of Net Outflow
Robertson	Agriculture, Forestry, Fishing and Hunting	11	0.0
Robertson	Mining, Quarrying, and Oil and Gas Extraction	21	0.0
Robertson	Utilities	22	0.3
Robertson	Construction	23	8.5
Robertson	Manufacturing	31-33	0.0
Robertson	Wholesale Trade	42	5.8
Robertson	Retail Trade	44-45	9.8
Robertson	Transportation and Warehousing	48-49	0.3
Robertson	Information	51	3.7
Robertson	Finance and Insurance	52	5.2
Robertson	Real Estate and Rental and Leasing	53	2.7
Robertson	Professional, Scientific, and Technical Services	54	10.3
Robertson	Management of Companies and Enterprises	55	3.5
Robertson	Administration & Support, Waste Management and Remediation	56	5.6
Robertson	Educational Services	61	6.4
Robertson	Health Care and Social Assistance	62	15.5
Robertson	Arts, Entertainment, and Recreation	71	1.5

Robertson	Accommodation and Food Services	72	8.4
Robertson	Other Services (excluding Public Administration)	81	4.0
Robertson	Public Administration	90	8.4

Figure (A15) 2017 Longitudinal Employer-Household Dynamics

Rutherford County, TN			
County	Industry	NAICS	% of Net Outflow
Rutherford	Agriculture, Forestry, Fishing and Hunting	11	0.3
Rutherford	Mining, Quarrying, and Oil and Gas Extraction	21	0.1
Rutherford	Utilities	22	0.1
Rutherford	Construction	23	5.8
Rutherford	Manufacturing	31-33	0.0
Rutherford	Wholesale Trade	42	5.8
Rutherford	Retail Trade	44-45	5.2
Rutherford	Transportation and Warehousing	48-49	3.2
Rutherford	Information	51	0.5
Rutherford	Finance and Insurance	52	10.1
Rutherford	Real Estate and Rental and Leasing	53	3.0
Rutherford	Professional, Scientific, and Technical Services	54	15.3
Rutherford	Management of Companies and Enterprises	55	6.0
Rutherford	Administration & Support, Waste Management and Remediation	56	7.2
Rutherford	Educational Services	61	5.8
Rutherford	Health Care and Social Assistance	62	12.7
Rutherford	Arts, Entertainment, and Recreation	71	2.0
Rutherford	Accommodation and Food Services	72	5.2
Rutherford	Other Services (excluding Public Administration)	81	3.7
Rutherford	Public Administration	90	8.2

Figure (A16) 2017 Longitudinal Employer-Household Dynamics

Smith County, TN			
County	Industry	NAICS	% of Net Outflow
Smith	Agriculture, Forestry, Fishing and Hunting	11	0.1
Smith	Mining, Quarrying, and Oil and Gas Extraction	21	0.0
Smith	Utilities	22	0.3
Smith	Construction	23	6.5
Smith	Manufacturing	31-33	5.7
Smith	Wholesale Trade	42	6.7
Smith	Retail Trade	44-45	16.1
Smith	Transportation and Warehousing	48-49	8.2
Smith	Information	51	2.0
Smith	Finance and Insurance	52	3.4
Smith	Real Estate and Rental and Leasing	53	1.3
Smith	Professional, Scientific, and Technical Services	54	3.9
Smith	Management of Companies and Enterprises	55	2.5
Smith	Administration & Support, Waste Management and Remediation	56	8.3
Smith	Educational Services	61	4.4
Smith	Health Care and Social Assistance	62	14.4
Smith	Arts, Entertainment, and Recreation	71	1.1
Smith	Accommodation and Food Services	72	8.6
Smith	Other Services (excluding Public Administration)	81	3.1
Smith	Public Administration	90	3.5

Figure (A17) 2017 Longitudinal Employer-Household Dynamics

Sumner County, TN			
County	Industry	NAICS	% of Net Outflow
Sumner	Agriculture, Forestry, Fishing and Hunting	11	0.2
Sumner	Mining, Quarrying, and Oil and Gas Extraction	21	0.1
Sumner	Utilities	22	0.9
Sumner	Construction	23	3.9

Sumner	Manufacturing	31-33	3.3
Sumner	Wholesale Trade	42	7.4
Sumner	Retail Trade	44-45	10.0
Sumner	Transportation and Warehousing	48-49	7.9
Sumner	Information	51	3.2
Sumner	Finance and Insurance	52	5.7
Sumner	Real Estate and Rental and Leasing	53	2.5
Sumner	Professional, Scientific, and Technical Services	54	7.0
Sumner	Management of Companies and Enterprises	55	3.9
Sumner	Administration & Support, Waste Management and Remediation	56	7.7
Sumner	Educational Services	61	4.7
Sumner	Health Care and Social Assistance	62	12.6
Sumner	Arts, Entertainment, and Recreation	71	1.6
Sumner	Accommodation and Food Services	72	7.9
Sumner	Other Services (excluding Public Administration)	81	2.8
Sumner	Public Administration	90	6.6

Figure (A18) 2017 Longitudinal Employer-Household Dynamics

County	Industry	NAICS	% of Net Outflow
Trousdale County, TN			
Trousdale	Agriculture, Forestry, Fishing and Hunting	11	0.2
Trousdale	Mining, Quarrying, and Oil and Gas Extraction	21	0.3
Trousdale	Utilities	22	0.3
Trousdale	Construction	23	7.6
Trousdale	Manufacturing	31-33	16.0
Trousdale	Wholesale Trade	42	7.1
Trousdale	Retail Trade	44-45	11.3
Trousdale	Transportation and Warehousing	48-49	9.6
Trousdale	Information	51	1.9
Trousdale	Finance and Insurance	52	2.2

Trousdale	Real Estate and Rental and Leasing	53	1.0
Trousdale	Professional, Scientific, and Technical Services	54	4.0
Trousdale	Management of Companies and Enterprises	55	2.2
Trousdale	Administration & Support, Waste Management and Remediation	56	7.8
Trousdale	Educational Services	61	1.5
Trousdale	Health Care and Social Assistance	62	13.5
Trousdale	Arts, Entertainment, and Recreation	71	0.9
Trousdale	Accommodation and Food Services	72	7.6
Trousdale	Other Services (excluding Public Administration)	81	1.6
Trousdale	Public Administration	90	3.3

Figure (A19) 2017 Longitudinal Employer-Household Dynamics

Williamson County, TN			
County	Industry	NAICS	% of Net Outflow
Williamson	Agriculture, Forestry, Fishing and Hunting	11	0.0
Williamson	Mining, Quarrying, and Oil and Gas Extraction	21	0.3
Williamson	Utilities	22	0.8
Williamson	Construction	23	0.0
Williamson	Manufacturing	31-33	37.8
Williamson	Wholesale Trade	42	11.9
Williamson	Retail Trade	44-45	0.0
Williamson	Transportation and Warehousing	48-49	26.7
Williamson	Information	51	0.0
Williamson	Finance and Insurance	52	0.0
Williamson	Real Estate and Rental and Leasing	53	1.4
Williamson	Professional, Scientific, and Technical Services	54	0.0
Williamson	Management of Companies and Enterprises	55	0.0

Williamson	Administration & Support, Waste Management and Remediation	56	0.0
Williamson	Educational Services	61	6.9
Williamson	Health Care and Social Assistance	62	0.0
Williamson	Arts, Entertainment, and Recreation	71	0.0
Williamson	Accommodation and Food Services	72	0.0
Williamson	Other Services (excluding Public Administration)	81	0.0
Williamson	Public Administration	90	14.2

Figure (A20) 2017 Longitudinal Employer-Household Dynamics

Wilson County, TN			
County	Industry	NAICS	% of Net Outflow
Wilson	Agriculture, Forestry, Fishing and Hunting	11	0.2
Wilson	Mining, Quarrying, and Oil and Gas Extraction	21	0.0
Wilson	Utilities	22	0.6
Wilson	Construction	23	5.8
Wilson	Manufacturing	31-33	6.9
Wilson	Wholesale Trade	42	2.8
Wilson	Retail Trade	44-45	6.0
Wilson	Transportation and Warehousing	48-49	0.0
Wilson	Information	51	3.8
Wilson	Finance and Insurance	52	6.4
Wilson	Real Estate and Rental and Leasing	53	2.6
Wilson	Professional, Scientific, and Technical Services	54	12.4
Wilson	Management of Companies and Enterprises	55	2.9
Wilson	Administration & Support, Waste Management and Remediation	56	11.1
Wilson	Educational Services	61	5.4
Wilson	Health Care and Social Assistance	62	16.6

Wilson	Arts, Entertainment, and Recreation	71	1.7
Wilson	Accommodation and Food Services	72	4.7
Wilson	Other Services (excluding Public Administration)	81	1.9
Wilson	Public Administration	90	8.0

Figure (A21) 2017 Longitudinal Employer-Household Dynamics

Trigg County, KY			
County	Industry	NAICS	% of Net Outflow
Trigg	Agriculture, Forestry, Fishing and Hunting	11	0.0
Trigg	Mining, Quarrying, and Oil and Gas Extraction	21	1.0
Trigg	Utilities	22	0.6
Trigg	Construction	23	0.0
Trigg	Manufacturing	31-33	22.0
Trigg	Wholesale Trade	42	7.2
Trigg	Retail Trade	44-45	11.9
Trigg	Transportation and Warehousing	48-49	8.3
Trigg	Information	51	0.7
Trigg	Finance and Insurance	52	4.1
Trigg	Real Estate and Rental and Leasing	53	1.7
Trigg	Professional, Scientific, and Technical Services	54	1.7
Trigg	Management of Companies and Enterprises	55	0.7
Trigg	Administration & Support, Waste Management and Remediation	56	7.1
Trigg	Educational Services	61	4.7
Trigg	Health Care and Social Assistance	62	14.8
Trigg	Arts, Entertainment, and Recreation	71	0.0
Trigg	Accommodation and Food Services	72	5.4
Trigg	Other Services (excluding Public Administration)	81	1.8
Trigg	Public Administration	90	6.6

Figure (A22) 2017 Longitudinal Employer-Household Dynamics

**Appendix (S).**

This appendix has the complete results of the adult student survey.

**The first series of questions ask respondents to describe their school status:**

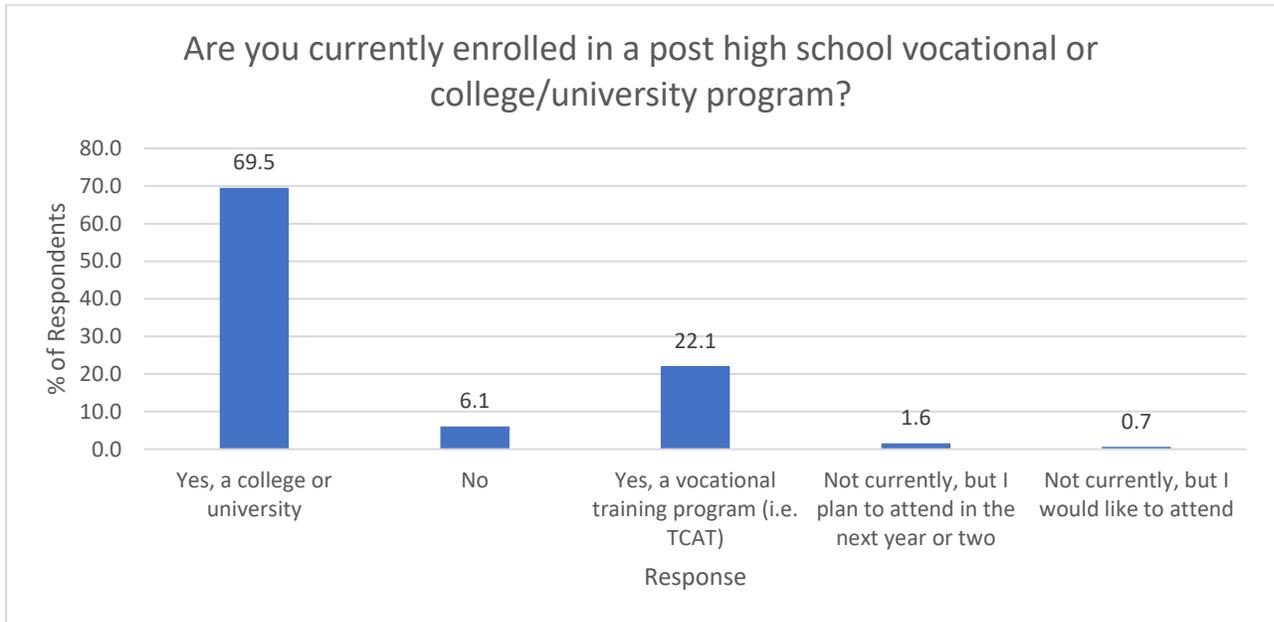


Figure (S1). Nashville Area Chamber of Commerce Student Survey, this was asked of all respondents

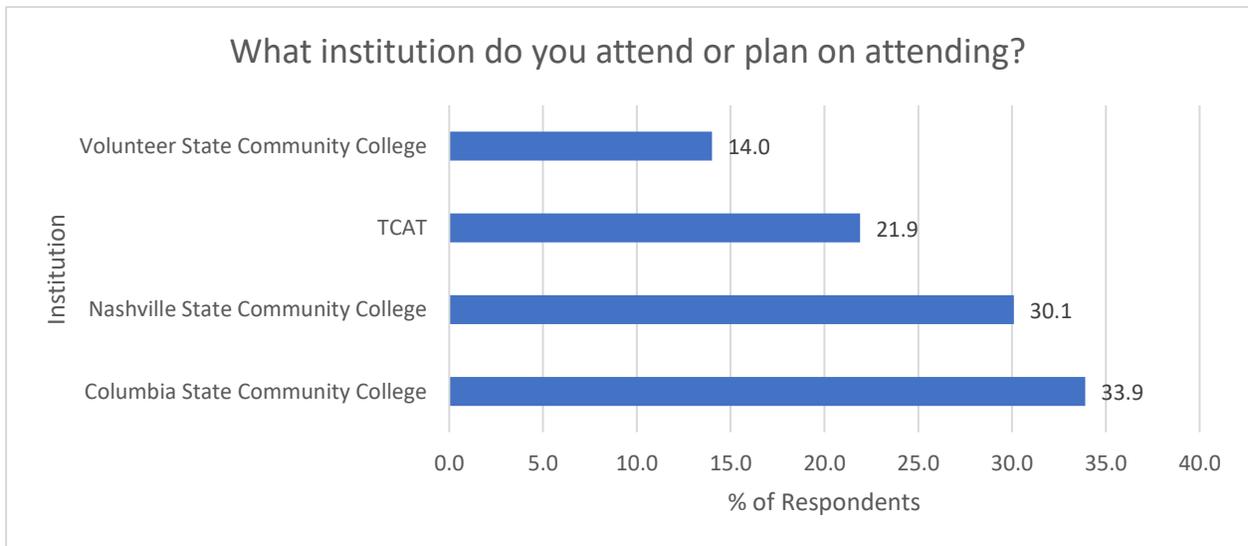


Figure (S34). Nashville Area Chamber of Commerce Student Survey, this was asked of all respondents

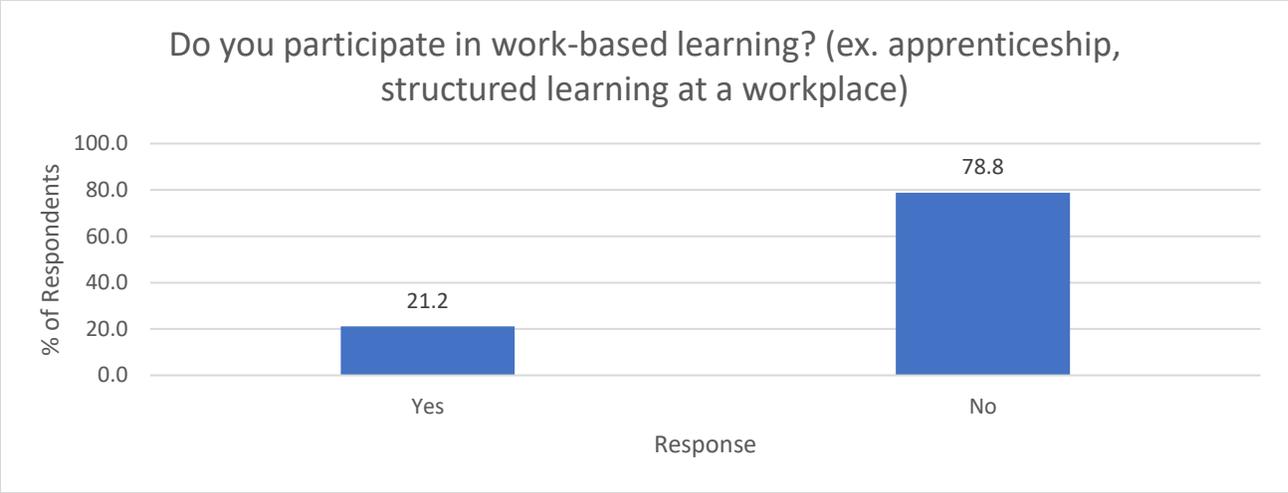


Figure (S2). Nashville Area Chamber of Commerce Student Survey, this was asked of all respondents

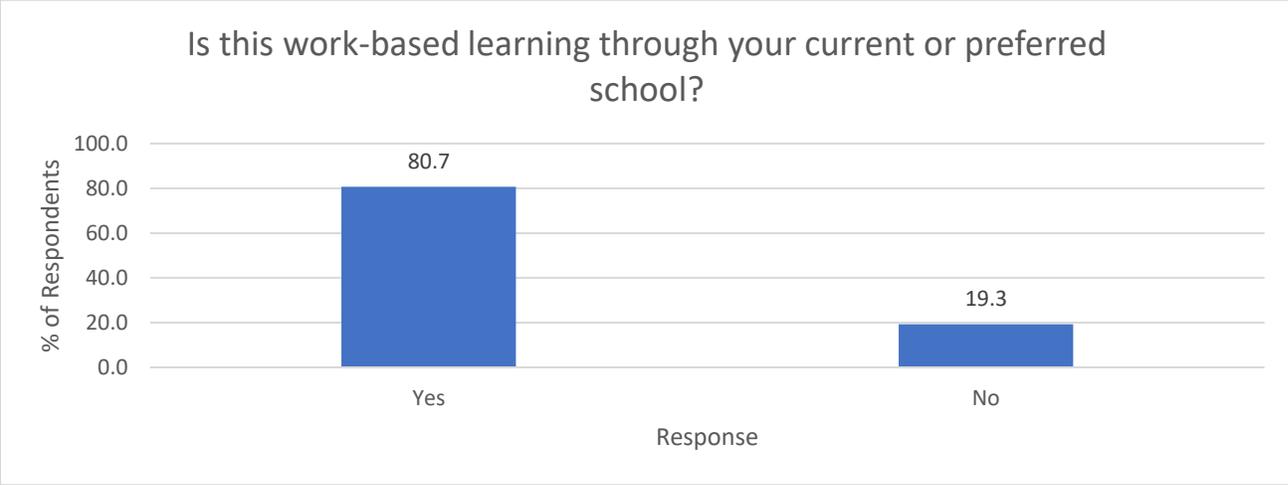


Figure (S3). Nashville Area Chamber of Commerce Student Survey, this was asked of respondents who indicated that they participate in work-based learning.

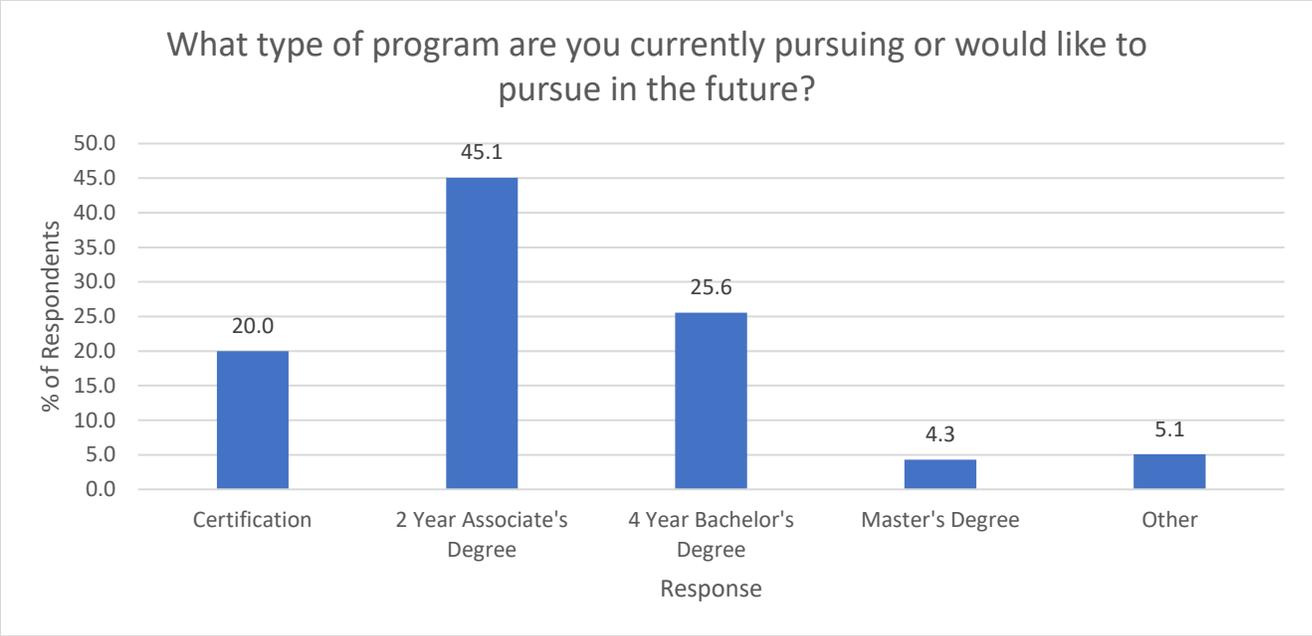


Figure (S4). Nashville Area Chamber of Commerce Student Survey, this was asked of all respondents

Most students are pursuing or plan on pursuing 2 year Associate’s degrees.

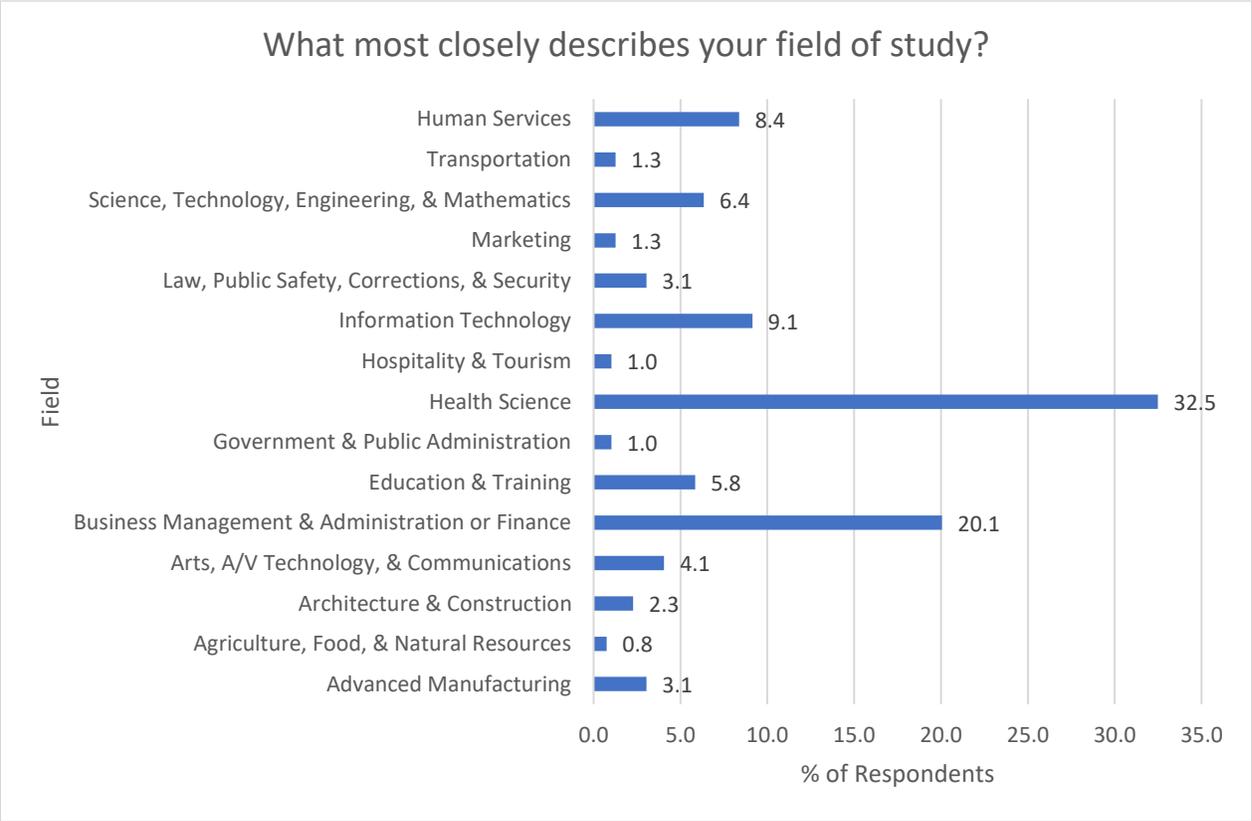


Figure (S5). Nashville Area Chamber of Commerce Student Survey, this was asked of all respondents

Students studying both health science and business management & administration or finance represent much larger shares than any other field of study.

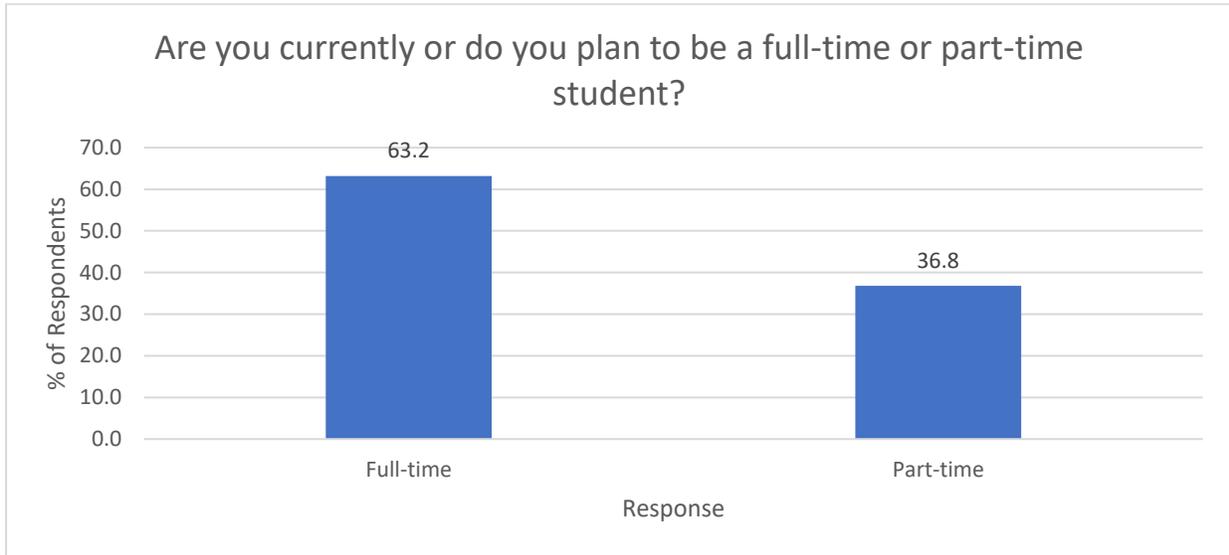


Figure (S6). Nashville Area Chamber of Commerce Student Survey, this was asked of all respondents

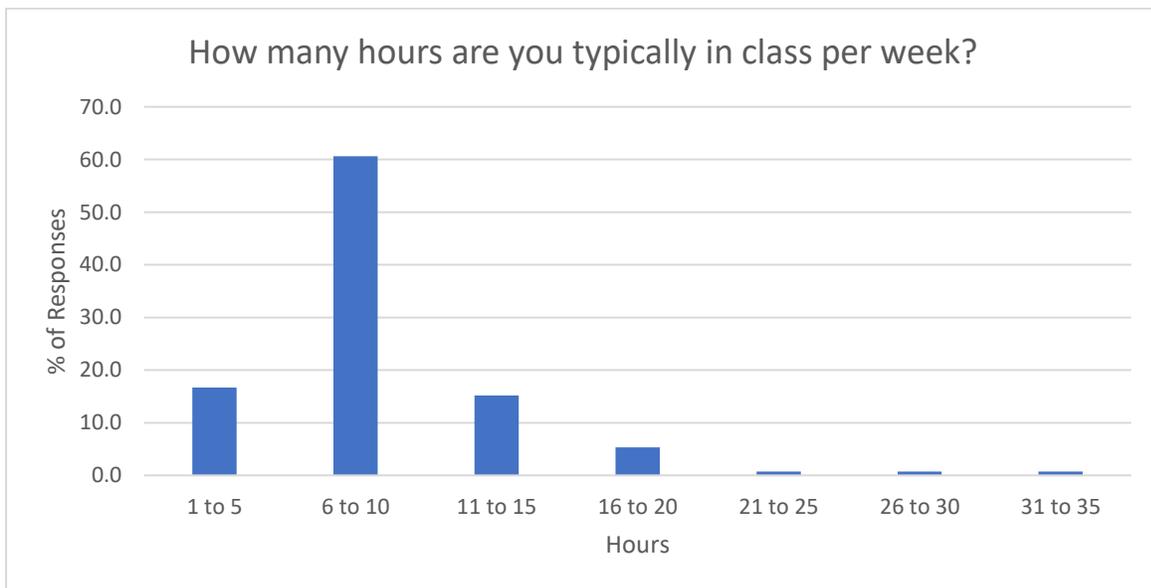


Figure (S7). Nashville Area Chamber of Commerce Student Survey, this was asked of all respondents

Most respondents indicate that they are typically in class from 6-10 hours every week.

**A spotlight into current employment, pay, and expected employment and pay shows that most students expect upward mobility:**

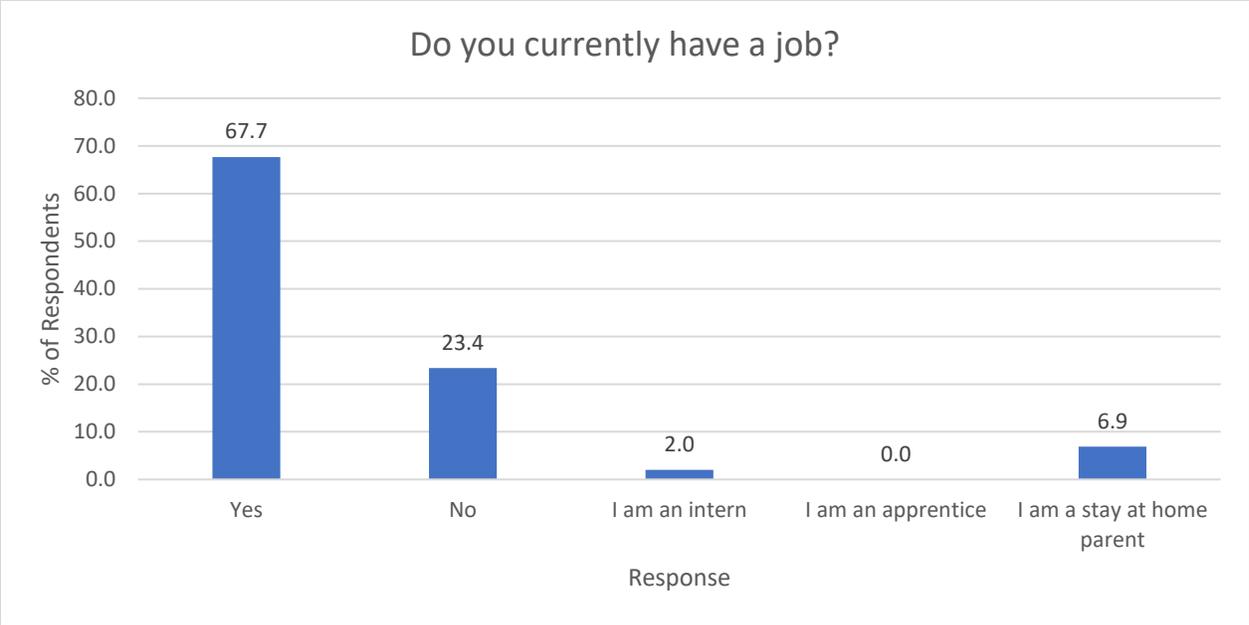


Figure (S8). Nashville Area Chamber of Commerce Student Survey, this was asked of all respondents  
 By far, most students surveyed are also working. Working students represent almost 70% of all surveyed.

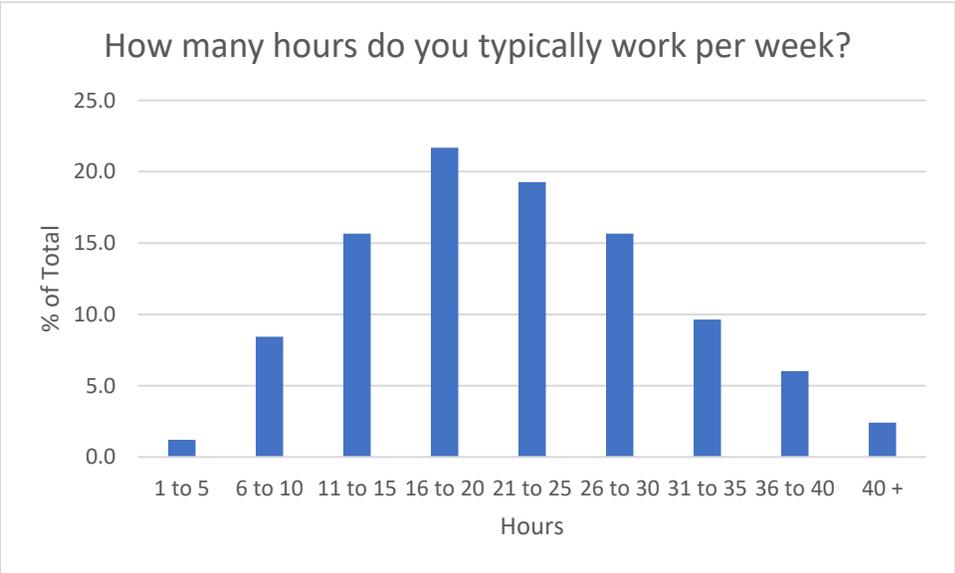


Figure (S9). Nashville Area Chamber of Commerce Student Survey, this was asked of respondents who indicated that they have a job

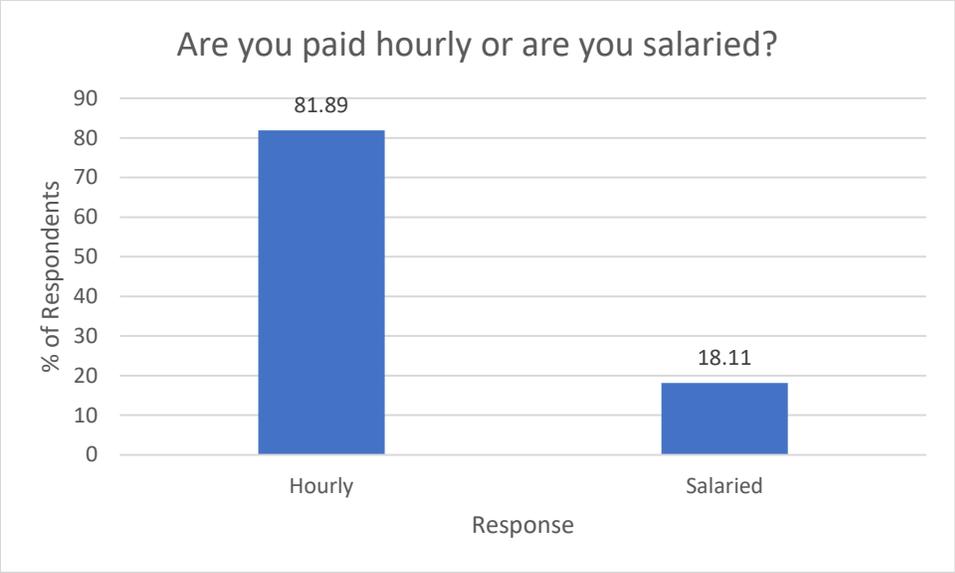


Figure (S10). Nashville Area Chamber of Commerce Student Survey, this was asked of respondents who indicated that they have a job

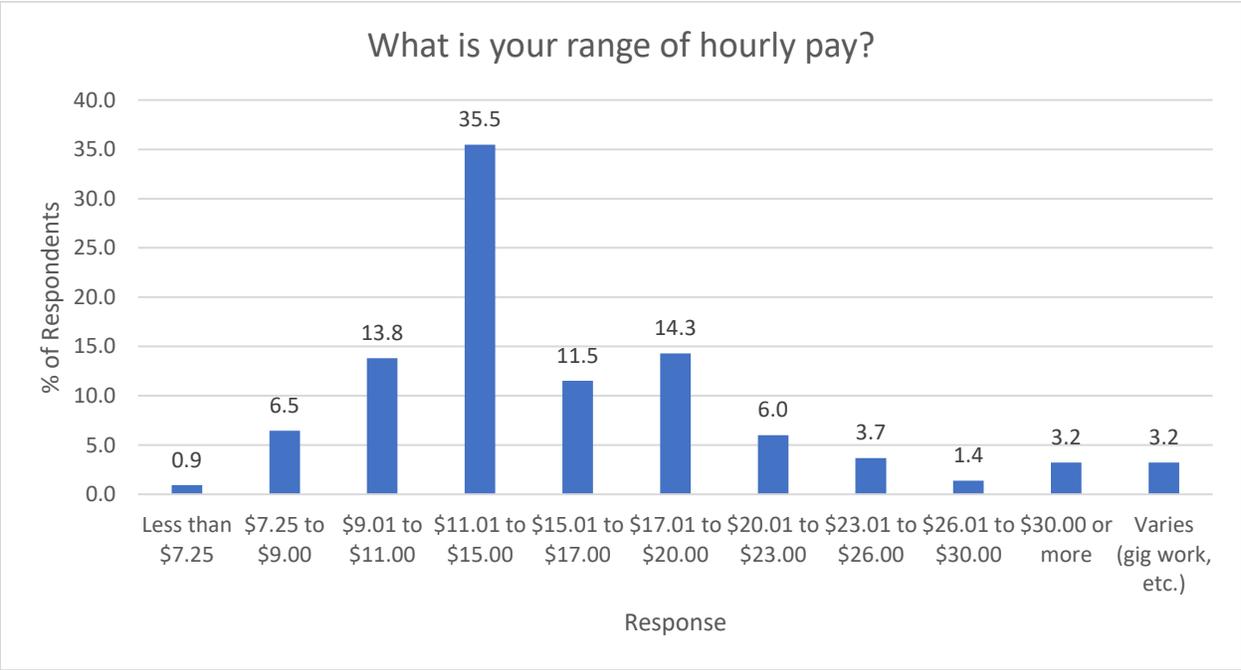


Figure (S11). Nashville Area Chamber of Commerce Student Survey, this was asked of respondents who indicated that they have a job and are paid hourly



Figure (S12). Nashville Area Chamber of Commerce Student Survey, this was asked of respondents who indicated that they have a job and are salaried

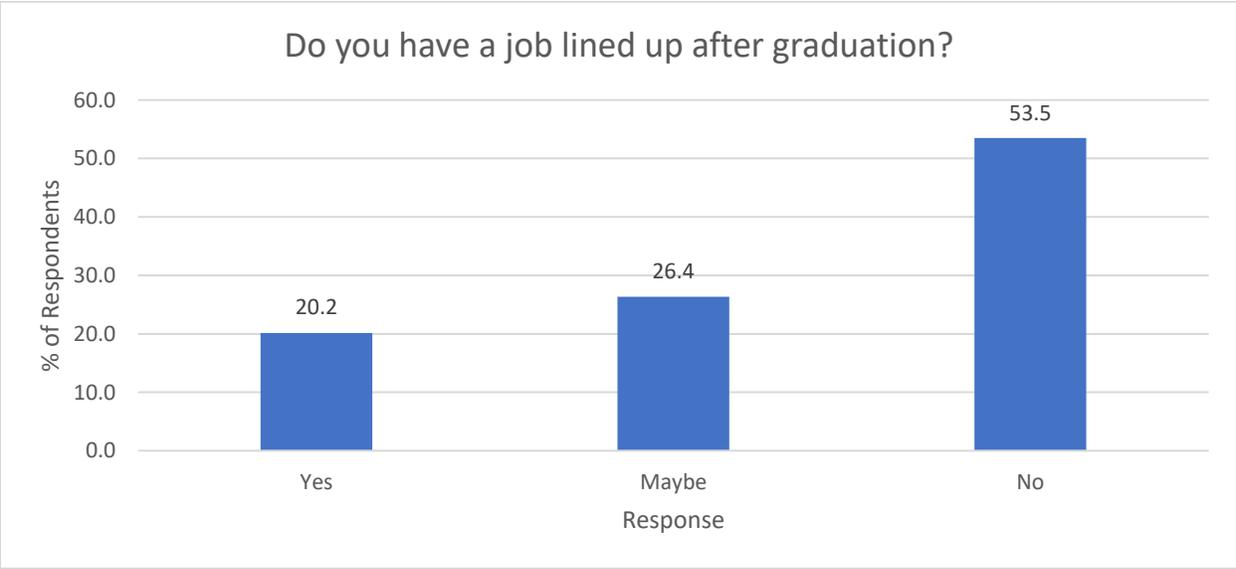


Figure (S13). Nashville Area Chamber of Commerce Student Survey, this was asked of all respondents  
 Many students do not have a job lined up after graduation.



Figure (S14). Nashville Area Chamber of Commerce Student Survey, this was asked of respondents that indicated that they did have a job lined up after graduation, and currently have a job

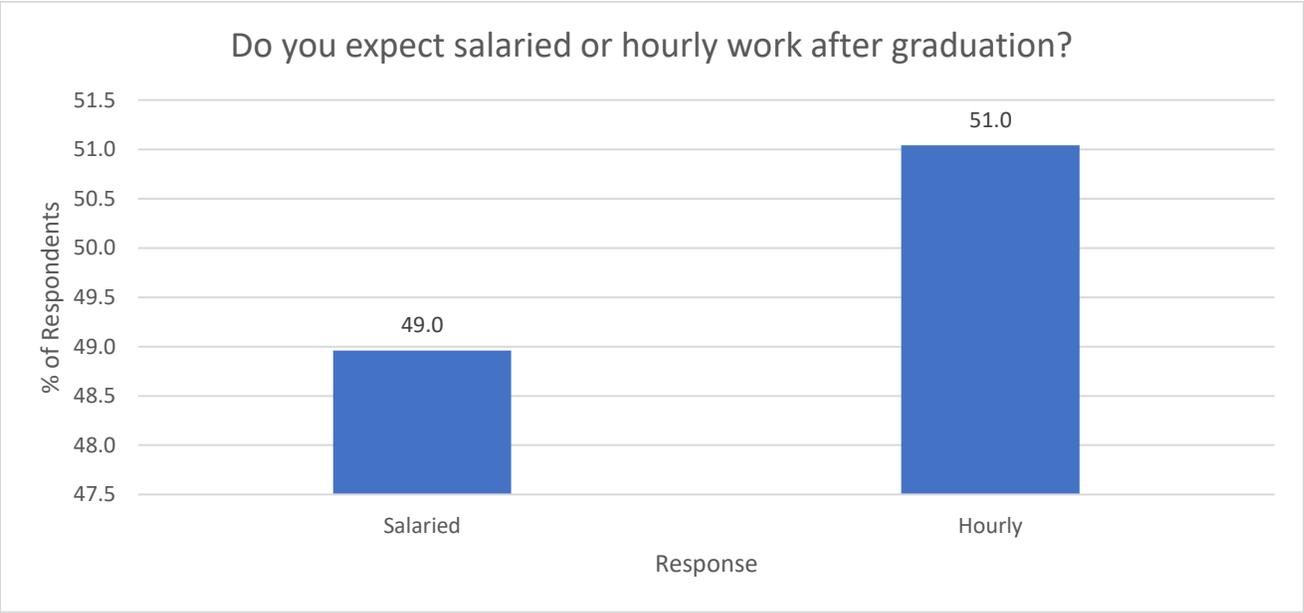


Figure (S15). Nashville Area Chamber of Commerce Student Survey, this was asked of all respondents

Notably, many students expect that they will switch from hourly to salaried work after graduation. This share changes from 18% who are currently salaried to 49% who expect to be salaried.

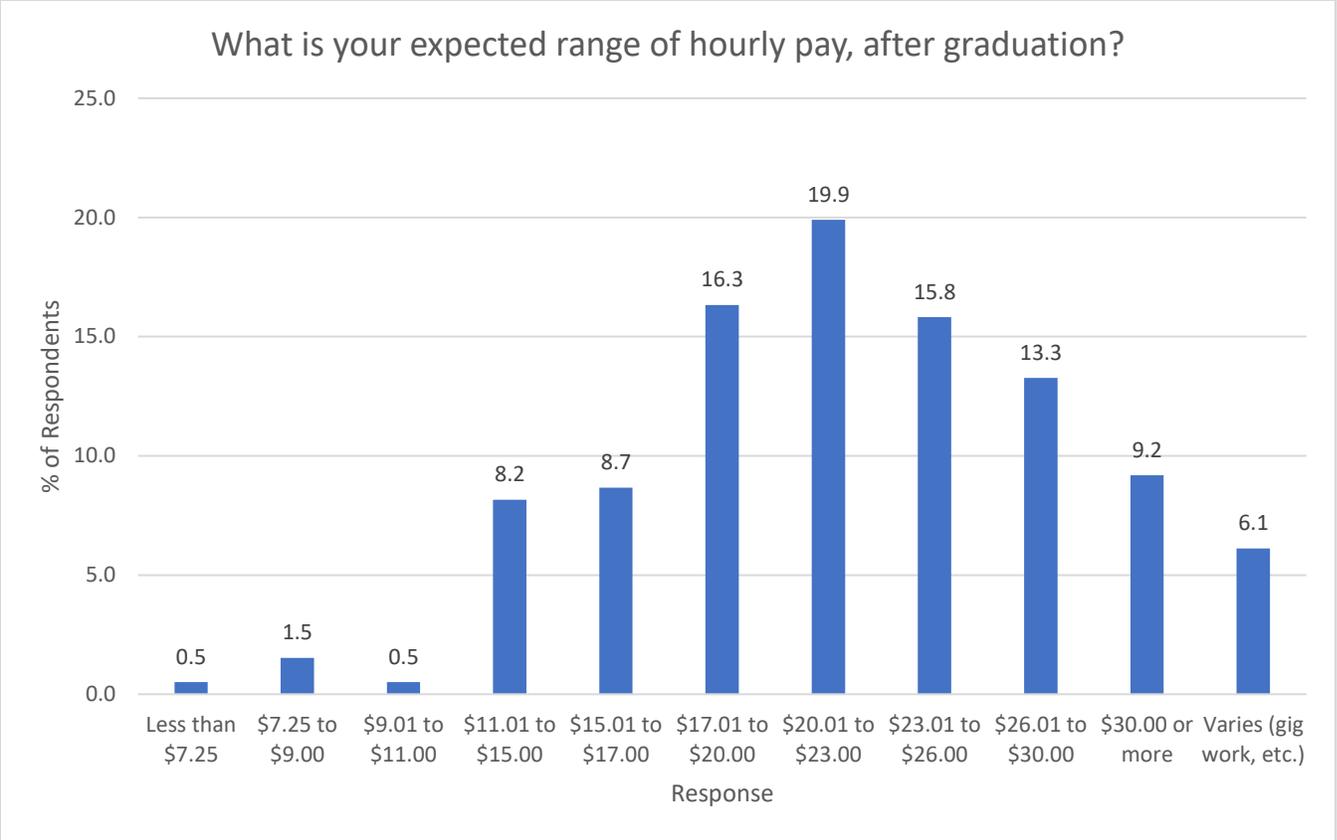


Figure (S16). Nashville Area Chamber of Commerce Student Survey, this was asked of respondents that indicated they expect hourly pay after graduation

The most frequently indicated category before school was \$11.01-\$15.00 at 35%, while after graduation the most expected category of hourly pay rises to \$20.01-\$23.00 at 20%.



Figure (S17). Nashville Area Chamber of Commerce Student Survey, this was asked of respondents who indicated that they expect salaried pay after graduation \*these will be in the correct order in the final document

Respondents were then asked a series of questions, branched where relevant, to reveal details about their current employment situation:

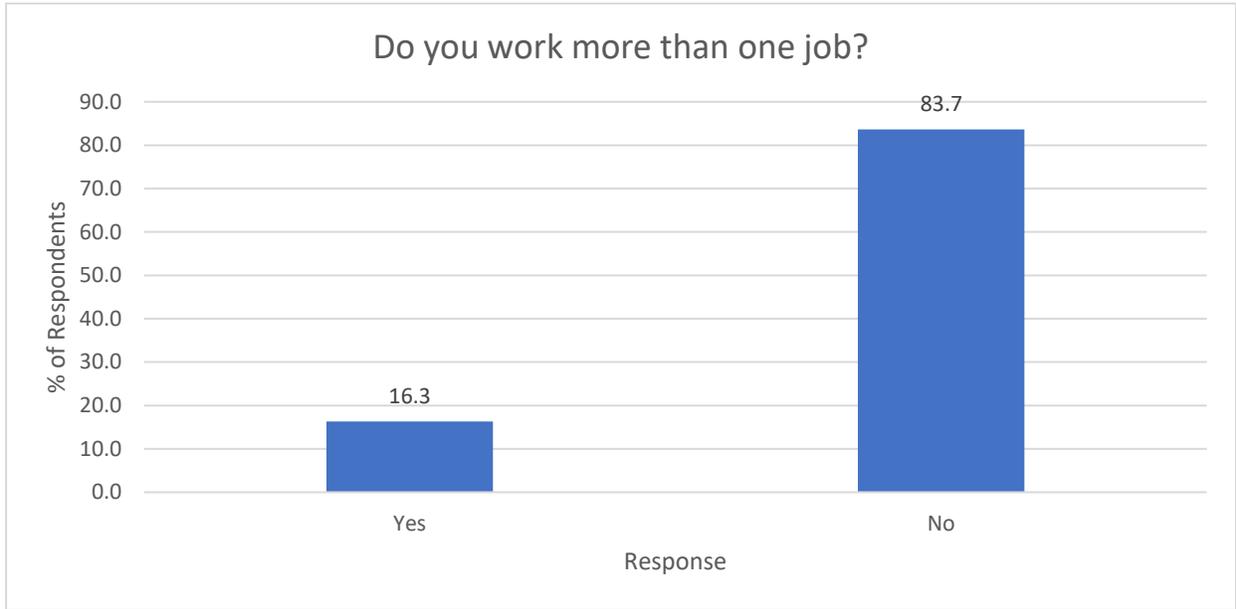


Figure (S18). Nashville Area Chamber of Commerce Student Survey, this was asked of all respondents

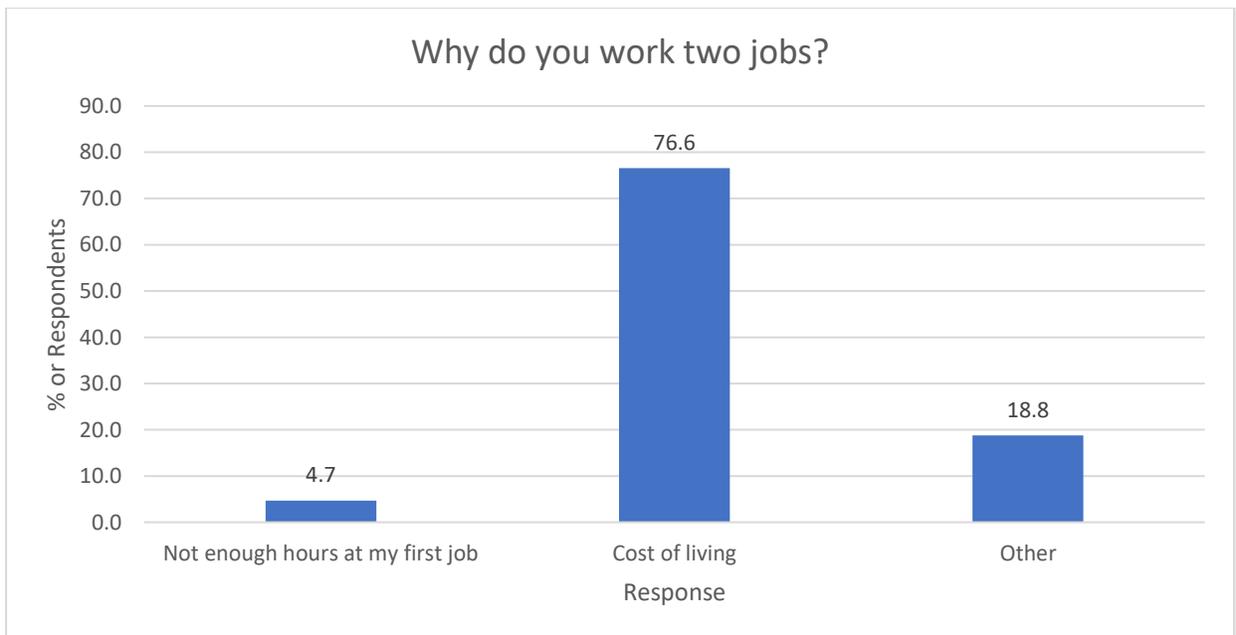


Figure (S19). Nashville Area Chamber of Commerce Student Survey, this was asked of respondents who indicated that they work more than one job

Those that selected “Other” listed that it was “to put extra money into savings”, “transitional”, “in the National Guard”, “optional”, “one full-time to pay the bills, PRN to keep EMS license, and a fun money job”, and “independent contractor”.

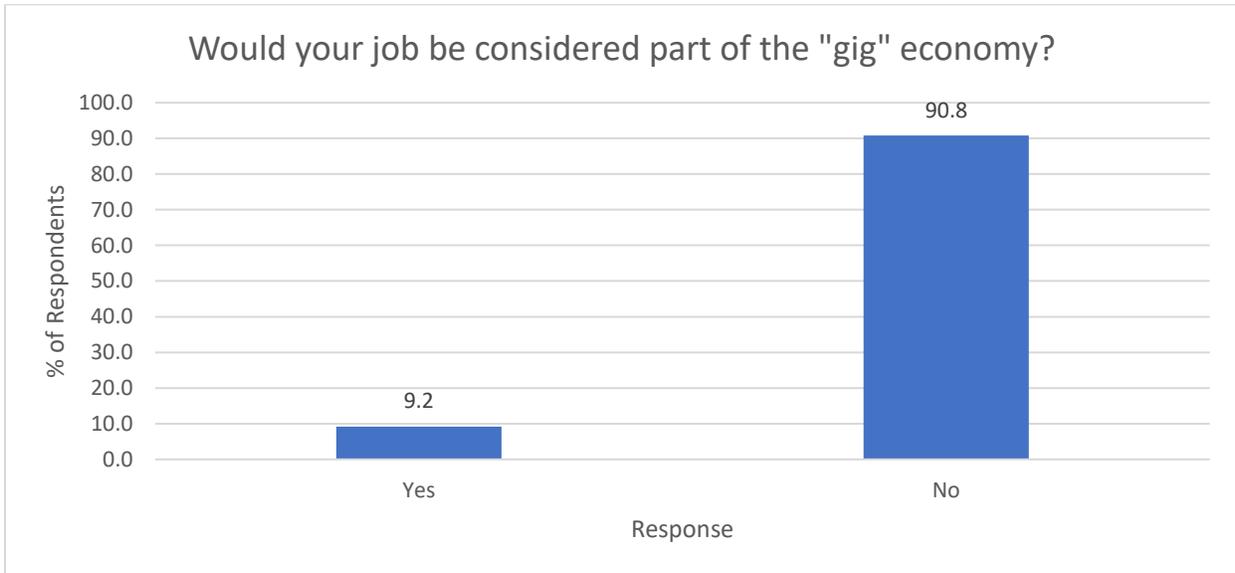


Figure (S20). Nashville Area Chamber of Commerce Student Survey, examples given to respondents included: Uber or Lyft driver, dog walker, food delivery via app. Service, etc., this was asked of respondents who indicated that they have a job

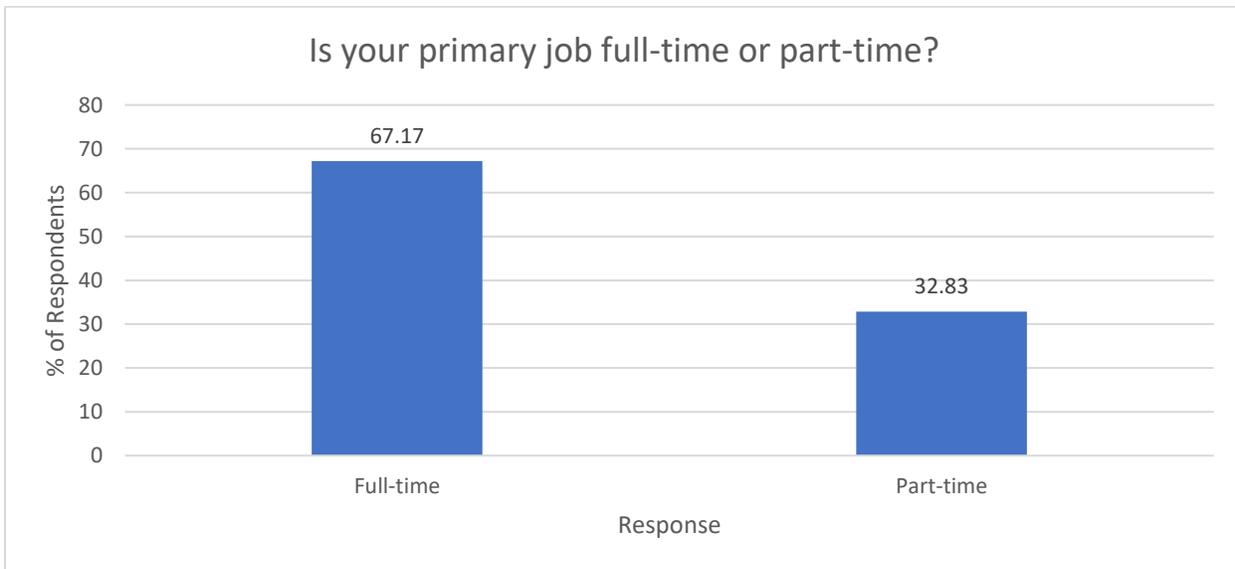


Figure (S21). Nashville Area Chamber of Commerce Student Survey, this was asked of respondents that indicated they have a job

**Next, respondents were asked to describe their schedule; how flexible their employer is, and what makes their schedule difficult:**

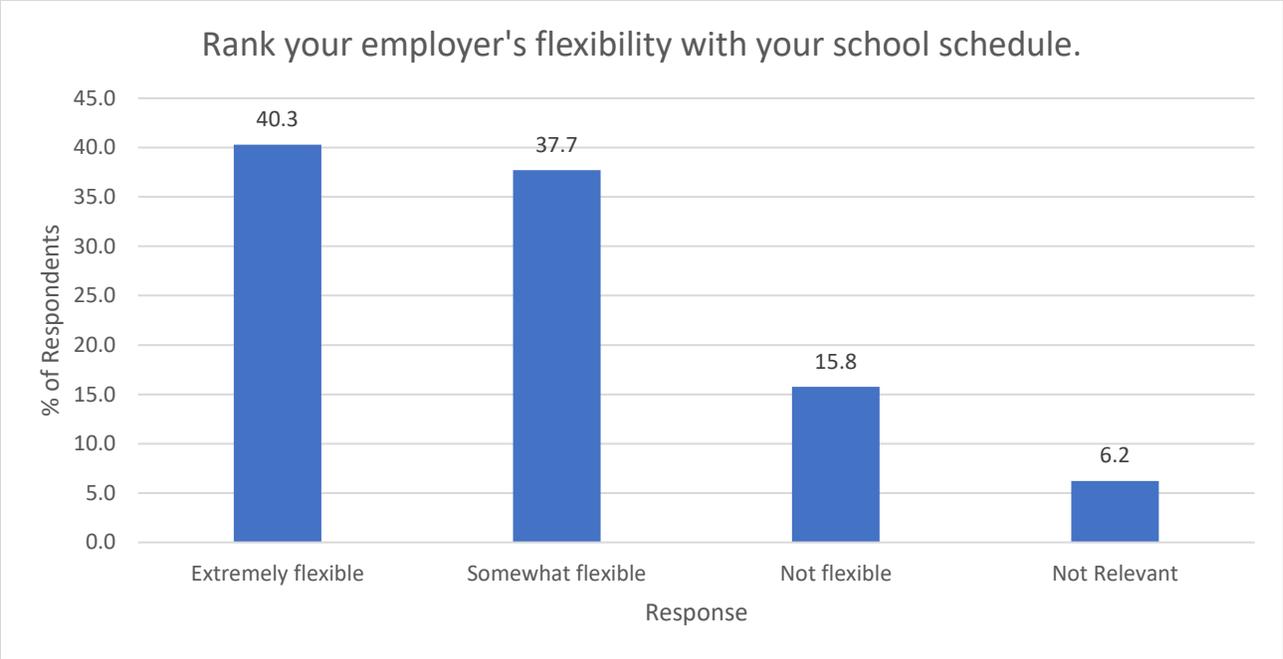


Figure (S22). Nashville Area Chamber of Commerce Student Survey, students who were not currently in school were asked to consider how their current employer has or will likely be in terms of flexibility, this was asked of respondents who indicated that they have a job

Encouragingly, many indicate that their employers are extremely flexible. However, 40% indicated that their employers are only somewhat flexible, and 16% indicated that their employers are not flexible with their school schedules.

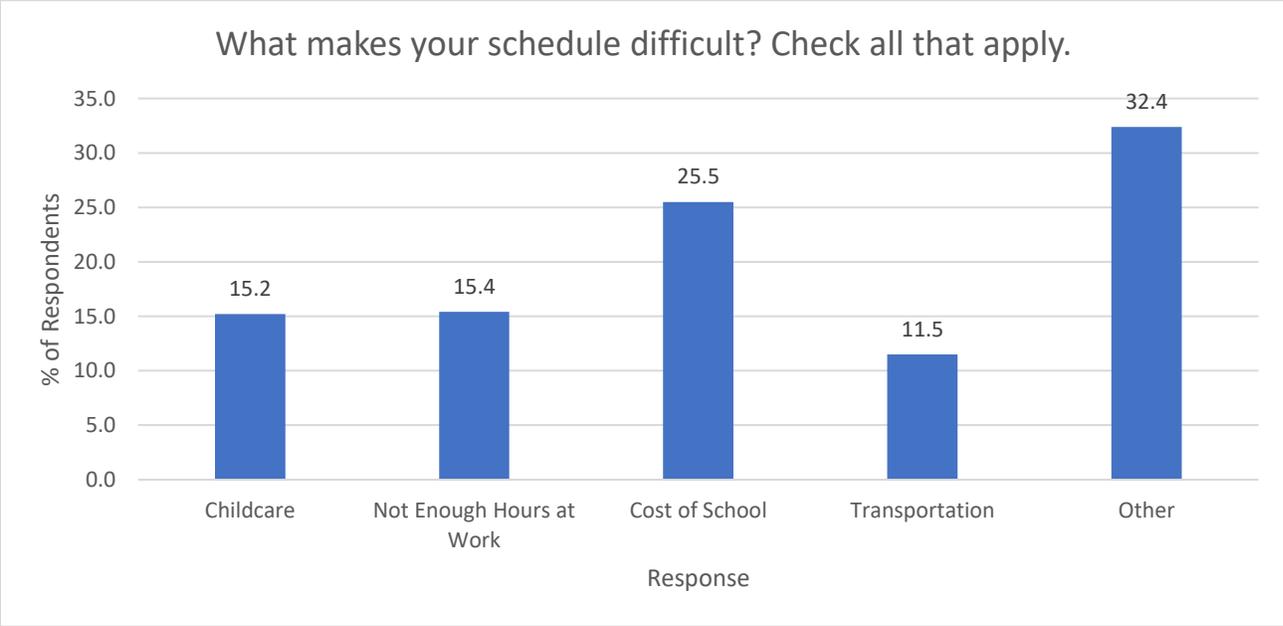


Figure (S23). Nashville Area Chamber of Commerce Student Survey, this was asked of all respondents

Of respondents who indicated “other”, many simply reiterated that their work schedule makes their entire schedule complicated. Many respondents indicated that splitting their time between work and school, even when they are receiving assistance with paying for school, causes them to accrue debt because they are unable to work enough to make ends meet. In this vein, some respondents indicate that jobs available to them do not pay enough so that they can reasonably reduce hours and commit adequate time to school. Others mention class availability and lack of internet access at home. Finally, many respondents indicated that there are simply not enough hours in the day to work, go to school, and spend quality time with their families.

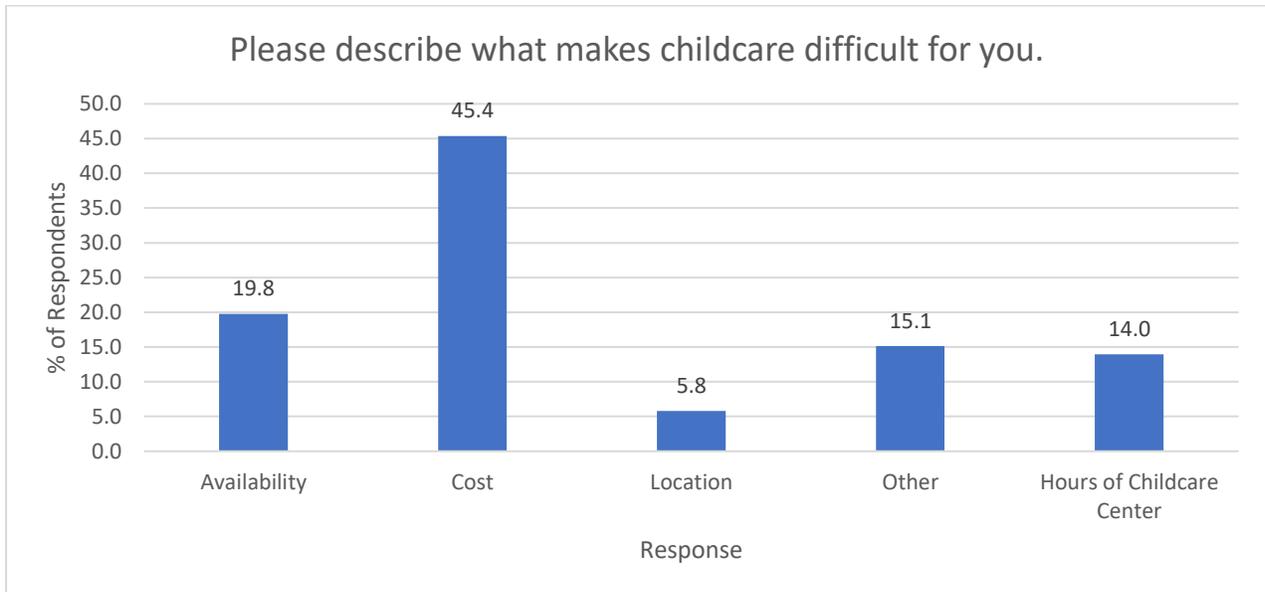


Figure (S24). Nashville Area Chamber of Commerce Student Survey, this was asked of respondents who indicated that “childcare” makes their schedule difficult

Those who selected “other” listed, among other things, that they have children with special needs, that transportation for older children that cannot drive yet was difficult, or that they simply have a lot of children.

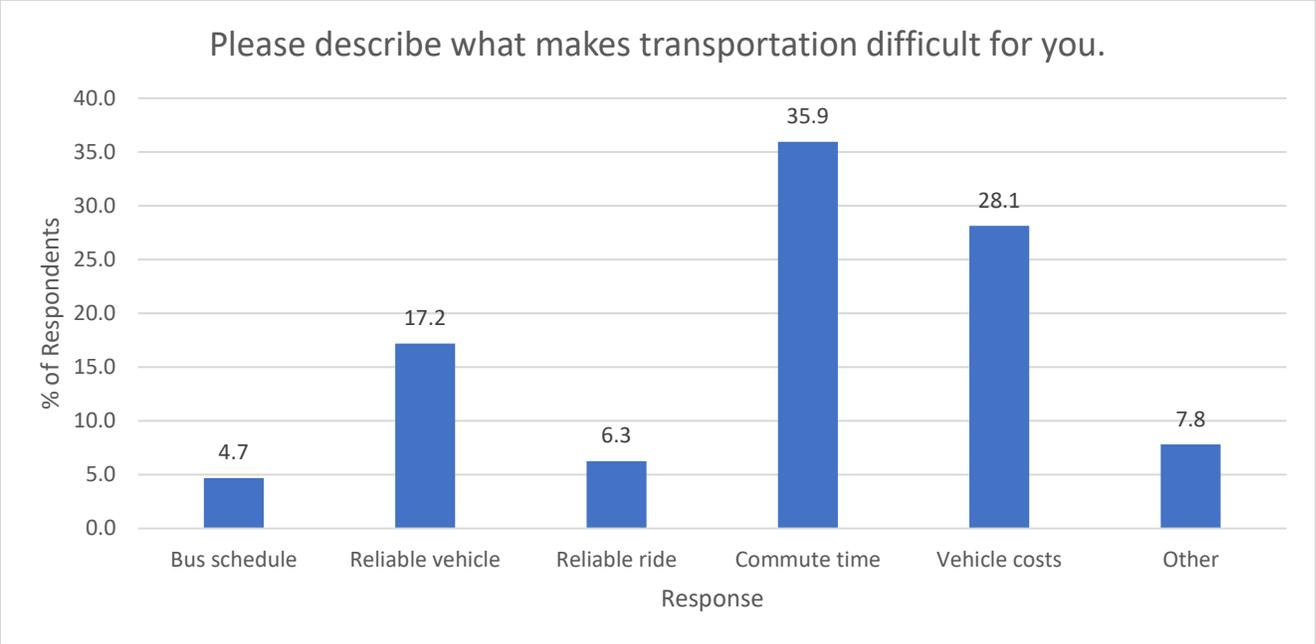


Figure (S25). Nashville Area Chamber of Commerce Student Survey, this was asked of respondents who indicated that “transportation” makes their schedule difficult

Those who selected “other” listed, among other things, cost of gas and the difficulties that come with sharing a vehicle.

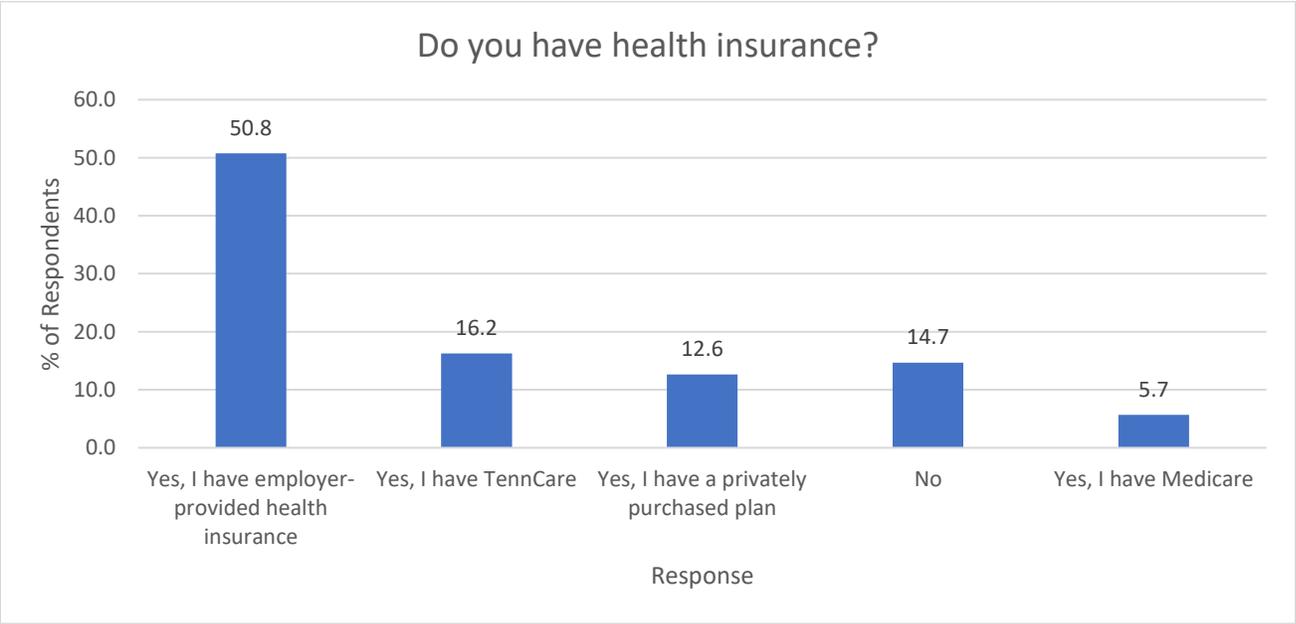


Figure (S26). Nashville Area Chamber of Commerce Student Survey, this was asked of all respondents

Most respondents indicate that they have healthcare in some form. However, approximately 15% respond that they do not. This is still a large share of respondents and is cause for concern.

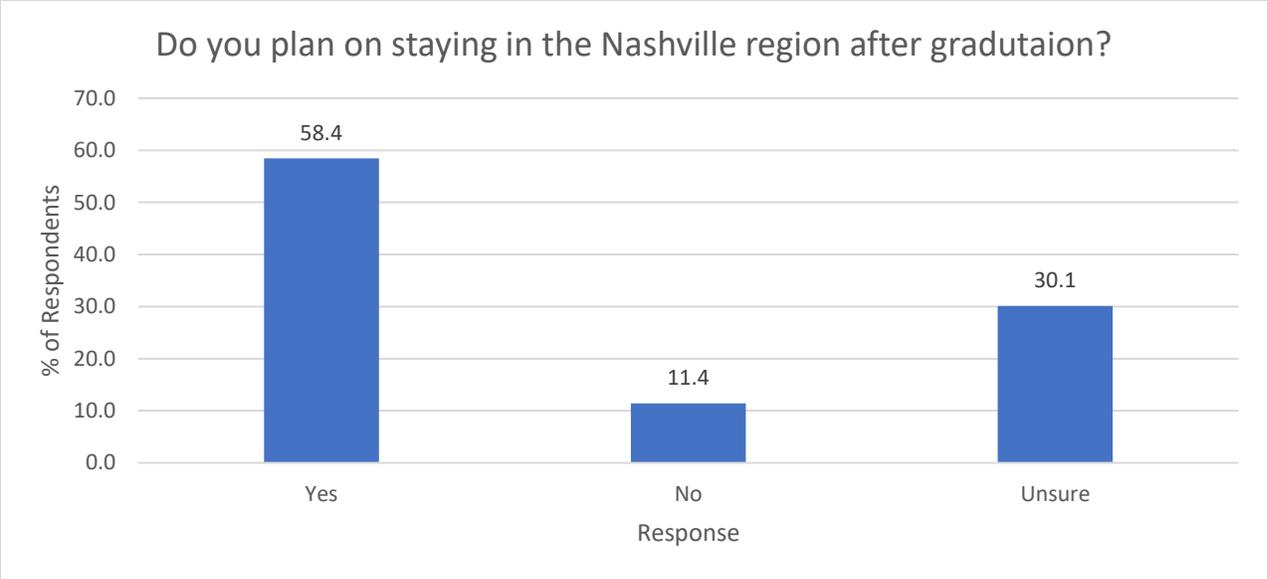


Figure (S27). Nashville Area Chamber of Commerce Student Survey, this was asked of all respondents. Almost 60% of respondents indicate that they plan on staying in the Nashville region after graduation. This is a positive indication that the talent and skills that are being cultivated in adult students by our local institutions will be used in our region, and that more people in our region will be poised to experience upward economic mobility and quality of life.

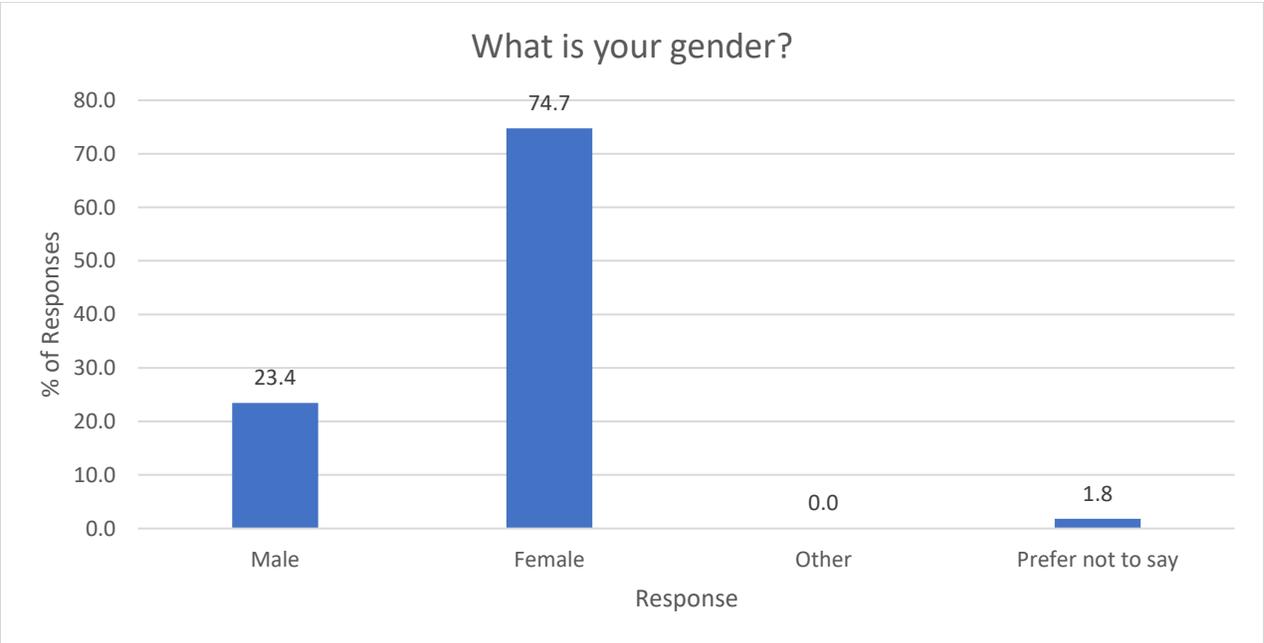


Figure (S28). Nashville Area Chamber of Commerce Student Survey, this was asked of all respondents. Notably, more females than males comprise our sample.

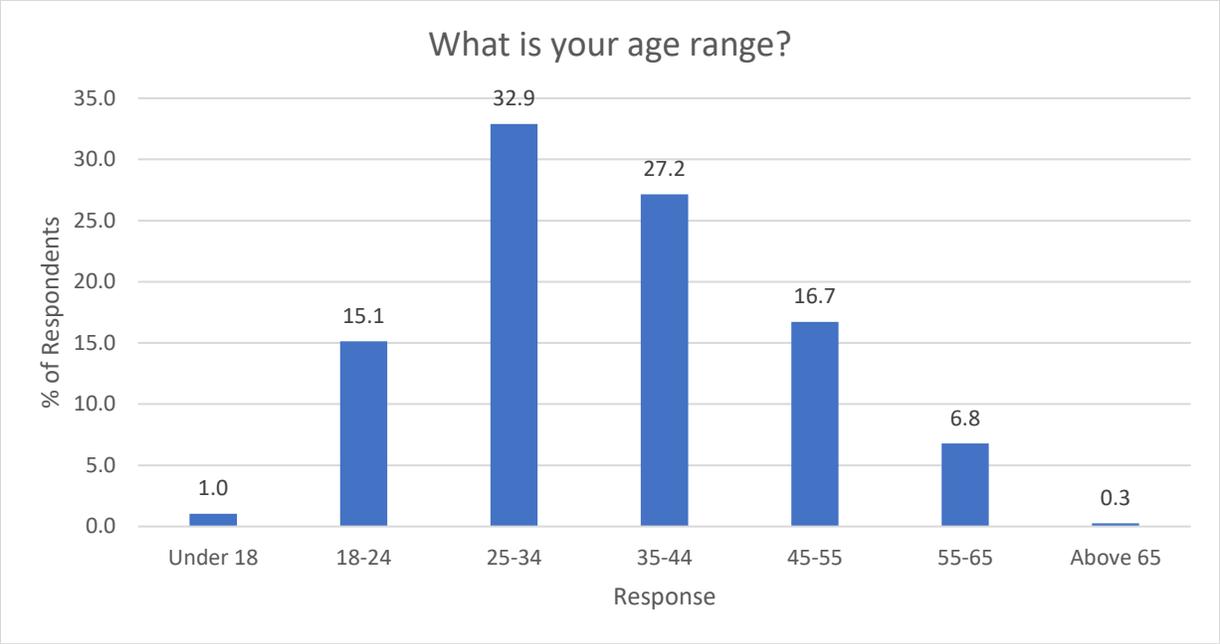


Figure (S29). Nashville Area Chamber of Commerce Student Survey, this was asked of all respondents

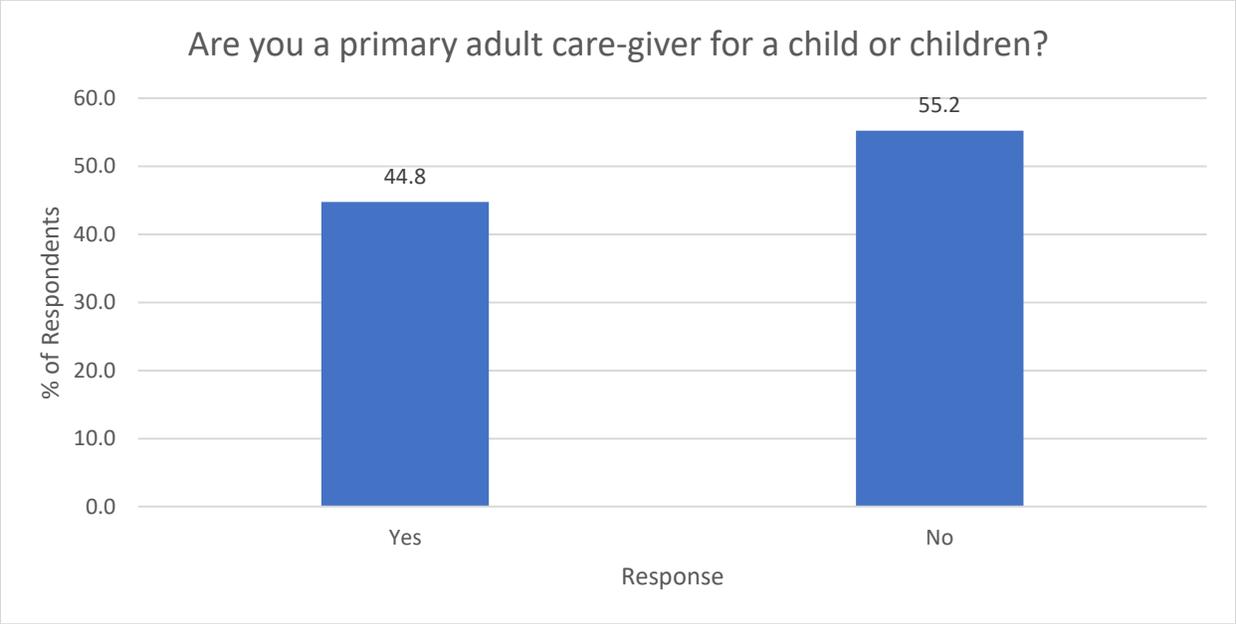


Figure (S30). Nashville Area Chamber of Commerce Student Survey, this was asked of all respondents

**Finally, respondents were asked to indicate if they receive supportive benefits in terms of financial aid or State benefits. Almost 30% of respondents receive both Pell or TN Reconnect assistance, while 12 and 10% respectively receive SNAP and TANF benefits.**

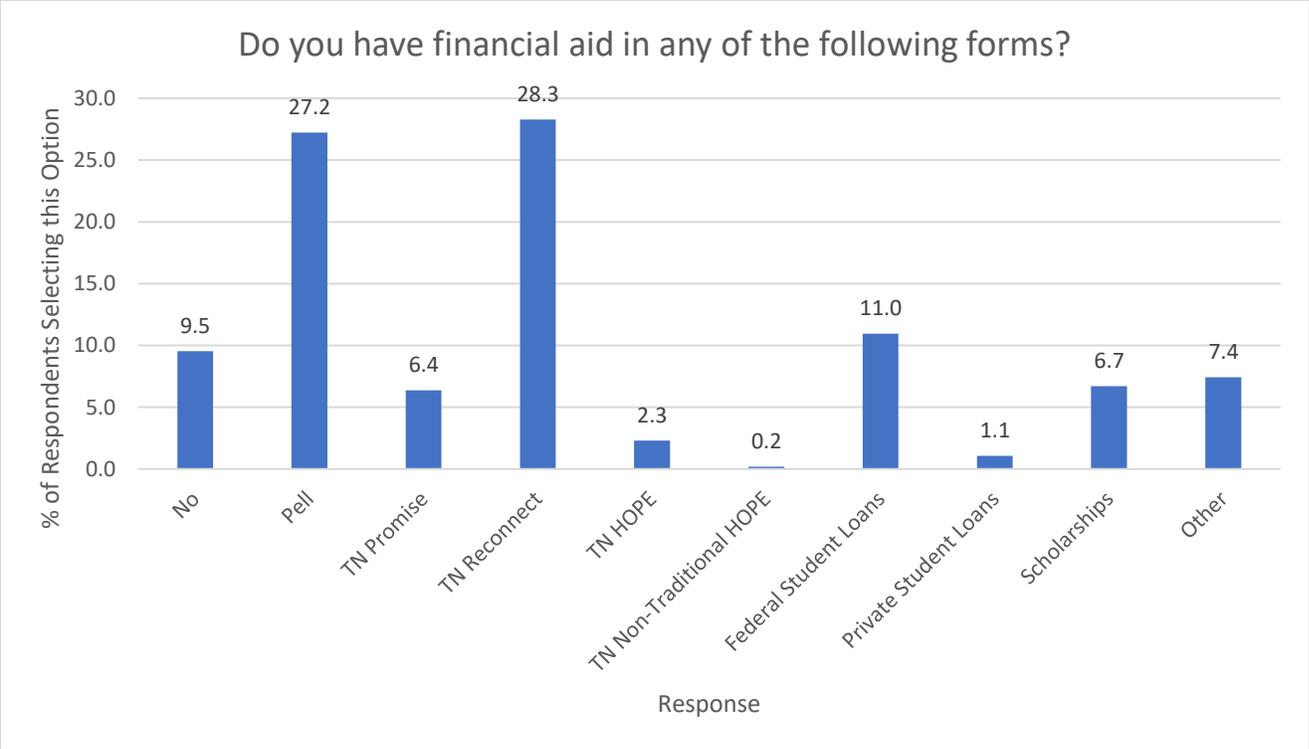


Figure (S31). Nashville Area Chamber of Commerce Student Survey, Respondents were instructed to check all that applied, this was asked of all respondents.

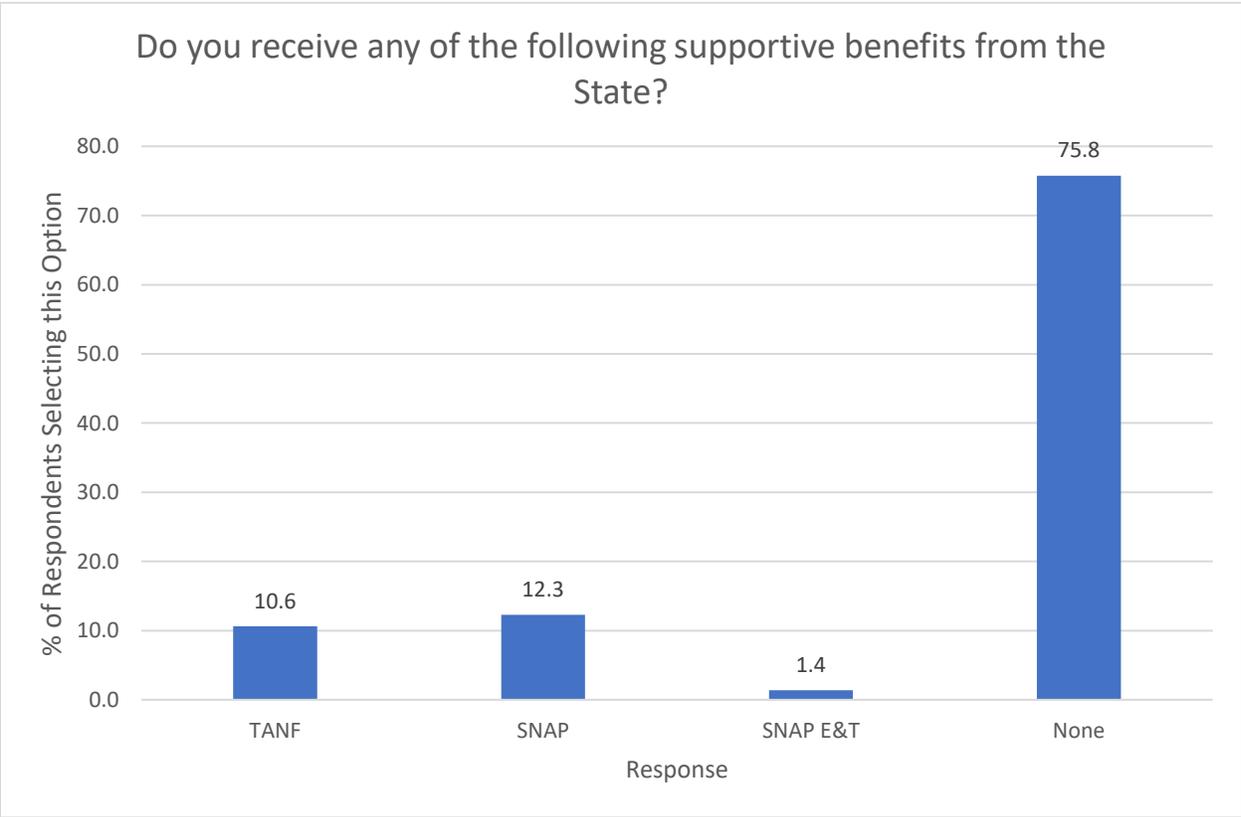


Figure (S32). Nashville Area Chamber of Commerce Student Survey, Respondents were instructed to check all that applied, this was asked of all respondents