

GO Virginia Regional Career and Technical Education Study Report Appendix

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A.1 Workforce Data Tables

Table 1
Workforce Data on Occupations in Selected Clusters for Virginia LWDA 3

Career Cluster & Pathway	Training Key	Median Salary 2017	Projected # of Jobs, 2026	Annual Job Openings	Projected Growth 2016 - 2026
Architecture & Construction			11,139	1,134	5%
<u>Construction</u>			<u>7,327</u>	<u>728</u>	<u>3%</u>
· Carpenters	1, 2	\$41,340	1,440	130	2%
· Construction Laborers	1, 2	\$29,440	1,215	125	5%
· Electricians	2, 3	\$48,110	789	87	2%
· Supervisors of Construction and Extraction Workers	1, 4	\$62,970	759	74	4%
· Plumbers, Pipefitters, and Steamfitters	1, 2	\$47,270	631	67	8%
· Painters, Construction and Maintenance	1, 2	\$36,980	476	39	-2%
· Operating Engineers and Other Construction Equipment Operators	1, 2	\$40,050	386	42	5%
· Construction Managers	2, 5	\$100,730	368	26	5%
· Helpers—Electricians	1, 2	\$28,430	222	30	0%
· Cement Masons and Concrete Finishers	1, 2	\$39,410	203	23	4%
· Roofers	1, 2	\$41,730	190	18	2%
· Paving, Surfacing, and Tamping Equipment Operators	1, 2	\$32,540	163	17	6%
· Brickmasons and Blockmasons	1, 2	\$45,890	139	12	1%
· Structural Iron and Steel Workers	1, 2	\$47,520	126	14	6%
· Excavating and Loading Machine and Dragline Operators	1, 2, 4	\$39,950	125	14	10%
· Structural Metal Fabricators and Fitters	1, 2	\$37,530	95	10	-17%
<u>Design/Pre-Construction</u>			<u>968</u>	<u>85</u>	<u>6%</u>
· Cost Estimators	2, 5	\$64,320	461	45	5%
· Civil Engineers	5	\$85,300	275	21	7%
· Civil Engineering Technicians	3	\$45,410	122	11	9%
· Architects, Except Landscape and Naval	2, 5	\$80,360	110	8	4%
<u>Maintenance/Operations</u>			<u>2,844</u>	<u>321</u>	<u>12%</u>
· Landscaping and Groundskeeping Workers	1,2	\$27,350	1,520	186	13%
· Heating, Air Conditioning, and Refrigeration Mechanics and Installers	2,3	\$48,950	582	58	7%
· Electrical Power-Line Installers and Repairers	2,3	\$66,850	286	25	15%
· Helpers--Installation, Maintenance, and Repair Workers	1,2	\$27,950	258	33	13%
· First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	1,4	\$47,280	198	19	13%

Health Sciences			19,642	1,578	17%
Diagnostic Services			<u>750</u>	<u>53</u>	<u>16%</u>
· Radiologic Technologists	3	\$58,040	303	18	11%
· Medical and Clinical Laboratory Technologists	5	–	176	12	14%
· Health Technologists and Technicians, All Other	2,3	\$47,480	148	11	15%
· Veterinary Technologists and Technicians	3	\$35,790	123	12	35%
Health Informatics			<u>624</u>	<u>54</u>	<u>17%</u>
· Medical Records and Health Information Technicians	2,3	\$37,290	359	23	10%
· Medical Secretaries	2,3	\$35,290	265	31	27%
Support Services			<u>868</u>	<u>98</u>	<u>22%</u>
· Medical and Health Services Managers	4,5	\$100,780	511	45	23%
· Veterinary Assistants and Laboratory Animal Caretakers	2,3	\$24,630	190	31	34%
· Healthcare Support Workers, All Other	1	\$40,770	167	22	10%
Therapeutic Services			<u>17,400</u>	<u>1,373</u>	<u>17%</u>
· Registered Nurses	5	\$66,060	4,837	282	12%
· Nursing Assistants	2,3	\$26,590	3,388	398	17%
· Licensed Practical and Licensed Vocational Nurses	2,3	\$42,310	1,422	110	14%
· Home Health Aides	1,2	\$21,770	889	112	54%
· Physicians and Surgeons, All Other	2,5	\$1	739	24	10%
· Pharmacy Technicians	2,3	\$29,840	626	51	10%
· Medical Assistants	2,3	\$32,260	616	72	32%
· Pharmacists	5	\$128,550	438	20	4%
· Dental Assistants	2,3	\$41,090	380	45	23%
· Physical Therapists	5	\$88,640	344	18	21%
· Physical Therapist Assistants	3	\$60,940	272	35	29%
· Surgeons	2,5	\$1	265	8	5%
· Physician Assistants	5	\$99,010	255	19	37%
· Family and General Practitioners	2,5	\$187,730	249	9	17%
· Respiratory Therapists	3	\$59,380	241	14	19%
· Nurse Practitioners	5	\$99,180	239	16	37%
· Dental Hygienists	3	\$82,400	233	17	23%
· Surgical Technologists	2,3	\$48,610	233	19	9%
· Opticians, Dispensing	2,3	\$44,520	224	17	10%
· Occupational Therapists	5	\$90,280	217	13	19%
· Speech-Language Pathologists	2,5	\$84,360	216	13	19%
· Internists, General	2,5	–	158	5	8%

· Veterinarians	5	\$94,850	155	8	35%
· Ophthalmic Medical Technicians	2,3	\$36,110	149	12	19%
· Pediatricians, General	2,5	\$181,580	146	5	11%
· Dietitians and Nutritionists	2,5	\$60,040	127	9	17%
· Dentists, General	5	\$156,700	121	5	20%
· Psychiatric Aides	1,2	\$27,120	115	14	7%
· Psychiatrists	2,5	\$1	106	3	2%
Information Technology			2,999	214	10%
Information Support & Services			726	56	11%
· Computer User Support Specialists	5	\$53,090	487	39	13%
· Computer Occupations, All Other	5	\$104,270	239	17	8%
Network Systems			1,054	72	8%
· Network and Computer Systems Administrators	5	\$89,990	424	28	7%
· Database Administrators	5	\$94,900	263	17	11%
· Computer Network Support Specialists	5	\$69,390	184	15	9%
· Computer Network Architects	4,5	\$116,380	183	12	8%
Programming & Software Development			1,219	86	11%
· Software Developers, Applications	5	\$106,500	402	32	28%
· Computer Systems Analysts	5	\$96,450	397	27	8%
· Software Developers, Systems Software	5	\$119,430	215	15	11%
· Computer Programmers	5	\$93,090	205	12	-10%
Manufacturing			13,695	1,429	-2%
Maintenance, Installation, & Repair			4,095	399	7%
· Maintenance and Repair Workers, General	1,2	\$38,320	1,870	187	8%
· First-Line Supervisors of Mechanics, Installers, and Repairers	1,3	\$68,410	722	64	7%
· Industrial Machinery Mechanics	1,2	\$50,230	607	54	6%
· Installation, Maintenance, and Repair Workers, All Other	1,2	\$44,830	245	25	9%
· Maintenance Workers, Machinery	1,2	\$48,590	204	22	4%
· Security and Fire Alarm Systems Installers	1,2	\$45,600	195	22	11%
· Computer, Automated Teller, and Office Machine Repairers	2,3	\$44,570	137	13	-5%
· Electronic Home Entertainment Equipment Installers and Repairers	2,3	\$38,230	115	12	-2%
Manufacturing Production Process Development			587	49	-2%
· Purchasing Agents, Except Wholesale, Retail, and Farm Products	2,5	–	304	24	-5%
· Electrical and Electronic Engineering Technicians	3	\$68,190	180	16	5%
· Industrial Engineering Technicians	3	\$51,560	103	9	-1%
Production			8,134	888	-5%
· Team Assemblers	1,2	–	1,764	192	-13%
· First-Line Supervisors of Production and Operating Workers	1,4	\$61,690	982	95	2%

· Welders, Cutters, Solderers, and Brazers	1,2	\$45,430	928	99	4%
· Helpers--Production Workers	1,2	\$25,270	720	110	17%
· Machinists	1,2	\$47,180	553	54	-2%
· Paper Goods Machine Setters, Operators, and Tenders	1,2	\$41,170	440	44	-2%
· Electrical and Electronic Equipment Assemblers	1,2	–	293	29	-26%
· Sewing Machine Operators	1,2	\$23,240	254	22	-25%
· Assemblers and Fabricators, All Other	1,2	–	229	25	-12%
· Cutting, Punching, & Press Machine Setters, Operators, and Tenders, Metal & Plastic	1,2	\$33,410	218	23	-10%
· Food Batchmakers	1,2	\$29,390	213	30	4%
· Cabinetmakers and Bench Carpenters	1,2	\$33,390	187	19	2%
· Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	1,2	\$46,040	173	19	-3%
· Molding, Coremaking, & Casting Machine Setters, Operators, & Tenders, Metal & Plastic	1,2	\$33,400	167	17	-18%
· Packaging and Filling Machine Operators and Tenders	1,2	\$29,380	163	19	1%
· Mixing and Blending Machine Setters, Operators, and Tenders	1,2	\$36,210	139	15	-9%
· Computer-Controlled Machine Tool Operators, Metal and Plastic	1,2	\$39,250	131	13	0%
· Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic	1,2	\$29,500	125	12	-8%
· Butchers and Meat Cutters	1,2	\$32,060	124	15	11%
· Sawing Machine Setters, Operators, and Tenders, Wood	1,2	\$28,340	122	14	4%
· Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	1,2	\$30,090	108	11	-9%
· Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	1,2	\$33,610	101	11	2%
Quality Assurance			879	93	-6%
· Inspectors, Testers, Sorters, Samplers, and Weighers	1,2	\$36,770	470	52	-12%
· Production, Planning, and Expediting Clerks	2,3	\$50,300	409	41	3%
Transportation, Distribution, & Logistics			14,834	1,742	9%
Facility and Mobile Equipment Maintenance			2,684	289	7%
· Automotive Service Technicians and Mechanics	2,3	\$43,220	1,065	100	4%
· Bus and Truck Mechanics and Diesel Engine Specialists	1,2	\$46,640	463	44	12%
· Cleaners of Vehicles and Equipment	1,2	\$20,620	415	59	8%
· Mobile Heavy Equipment Mechanics, Except Engines	1,2	\$51,560	278	27	8%
· Automotive Body and Related Repairers	1,2	\$44,050	164	15	9%
· Automotive and Watercraft Service Attendants	1,2	\$22,810	153	26	13%
· Tire Repairers and Changers	1,2	\$25,250	146	18	-6%
Logistics Planning & Management Services			365	31	5%
· Dispatchers, Except Police, Fire, and Ambulance	2,3	\$36,470	257	23	2%
· Transportation, Storage, and Distribution Managers	3,4	\$101,120	108	8	13%
Sales & Service			822	91	14%
· Billing and Posting Clerks	2,3	\$37,120	710	74	16%
· Parking Lot Attendants	1,2	\$22,560	112	17	6%

Transportation Operations			<u>10,963</u>	<u>1,331</u>	<u>9%</u>
· Laborers and Freight, Stock, and Material Movers, Hand	1,2	\$25,880	3,593	496	10%
· Heavy and Tractor-Trailer Truck Drivers	2,3	\$40,350	3,422	372	8%
· Light Truck or Delivery Services Drivers	1,2	\$29,080	1,350	148	10%
· Industrial Truck and Tractor Operators	1,2	\$35,930	998	112	7%
· Packers and Packagers, Hand	1,2	\$22,400	568	86	5%
· Bus Drivers, School or Special Client	1,2	\$29,440	497	61	11%
· First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	1,4	–	316	33	8%
· Taxi Drivers and Chauffeurs	1,2	\$26,220	219	23	15%

Note. Training key: 1 = HS or less, 2 = Training/certification, 3 = Associate/Some college, 4 = Work experience, 5 = Bachelor's or more. \$1 = Wage equal to or greater than \$100.00 per hour or \$208,000 per year; “-” signifies missing data. All occupations listed within the 5 targeted career clusters were included (i.e., no other conditions were applied).

(Source: Trailblazers: Career and Technical Education in Virginia, <http://ctetrailblazers.org/labor-market-data/>, using Virginia Employment Commission occupational employment projections)

Table 2

Existing Program Enrollment by Career Pathway or Occupation in Targeted Career Clusters in Virginia LWDA 3

Career Cluster, Pathways and Occupations	High Wage**	Training Key	2026 Projected Employment	% Growth	# of Enrolled Students*	Annual Job Openings
Architecture & Construction						
<i>Construction</i>						
Carpenters	Yes	1, 2	1,440	2%	98	130
Construction Laborers/Building Trades	No	1, 2	1,214	5%	367	125
Electricians	Yes	2, 3	789	2%	136	87
Brickmasons, Blockmasons, Cement Masons, & Concrete Finishers	Yes	1, 2	342	1 - 4%	83	35
<i>Design/Pre-Construction</i>						
Architects, except landscape and naval	Yes	2, 5	110	4%	47	8
<i>Maintenance</i>						
Landscaping and Groundskeeping Workers	No	1, 2	1,520	13%	19	186
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	Yes	2, 3	582	7%	70	58
Health Sciences						
<i>Diagnostic Services</i>						
Health Technologists and Technicians (other)	Yes	2, 3	148	15%	14	11
Veterinary Technologists and Technicians	No	3	123	35%	46	12
<i>Health Informatics</i>						
Medical Secretaries	No	2, 3	265	27%	117	31
<i>Therapeutic Services</i>						
Registered Nurses	Yes	5	4,837	12%	44	282
Nursing Assistants	No	2, 3	3,388	17%	130	398
Licensed Practical and Vocational Nurses	Yes	2, 3	1,422	14%	16	110
Pharmacy Technicians	No	2, 3	626	10%	52	51
Medical Assistants	No	2, 3	616	32%	83	72
Dental Assistants	Yes	2, 3	380	23%	73	45

Information Technology						
<i>Information Support & Services</i>						
Computer User Support Specialists	Yes	5	487	13%	10	39
<i>Network Systems</i>						
Network and Computer Systems Administrators	Yes	5	424	7%	348	28
<i>Programming and Software Development</i>						
Computer Programmers	Yes	5	205	-10%	145	12
Manufacturing						
<i>Maintenance, Installation, & Repair</i>						
Maintenance & Repair Workers, General	No	1, 2	1,870	8%	14	187
Industrial Machinery Mechanics	Yes	1, 2	607	6%	34	54
<i>Manufacturing Production Process Development</i>						
<i>Includes Industrial Engineering Technicians; Electrical and Electronic Engineering Technicians</i>						
<i>Production</i>						
Welders, Cutters, Solderers, & Brazers	Yes	1, 2	928	4%	436	99
Machinists	Yes	1, 2	553	-2%	154	54
Transportation, Distribution & Logistics						
<i>Facility and Mobile Equipment Maintenance</i>						
Automotive Service Technicians and Mechanics	Yes	2, 3	1,065	4%	303	100
Bus and Truck Mechanics and Diesel Engine Specialists	Yes	1, 2	463	12%	4	44
Automotive Body and Related Repairers	Yes	2, 3	164	9%	111	15
<i>Transportation Operations</i>						
Heavy and Tractor-Trailer Truck Drivers	Yes	2, 3	3,422	8%	389	372

Note. For this analysis, a high-wage career pathway is one in which 60% or more of the occupations in LWDA III had a median annual wage that exceeded the 2018 median annual wage for all U.S. workers (\$38,640; Source: Bureau of Labor Statistics; Trailblazers: Career and Technical Education in Virginia, <http://ctetrailblazers.org/labor-market-data/>, using Virginia Employment Commission occupational employment projections)

Table 2A

Existing Program Enrollment by Career Pathway or Occupation in Targeted Career Clusters in Virginia LWDA 3: Course Titles Included

<i>Career Cluster, Pathways and Occupations</i>	<i>Applicable Course Titles</i>
Architecture & Construction	
<i>Construction</i>	
Carpenters	RoTEC (Carpentry I, III), JRTC (Carpentry I, II, III)
Construction Laborers/Building Trades	BCAT (Building Trades III), BTEC (Building Trades I, II, III), FCCC (Building Trades I, II), DSLCC (NCCER Core Curriculum), VWCC (Contractor's License, Trades Renewal)
Electricians	FCCC (Electricity 1, 2, 3), JRTC (Electricity I, II, III), DSLCC (Electrical)
Brickmasons, Blockmasons, Cement Masons, & Concrete Finishers	BCAT (Masonry II, III), FCCC (Masonry I, II)
<i>Design/Pre-Construction</i>	
Architects, except landscape and naval	BCAT (Advanced drawing & design), SHS (Architectural Drawing I, II)
<i>Maintenance</i>	
Landscaping and Groundskeeping Workers	FCCC (Horticulture Operations)
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	FCCC (HVAC directed study, HVAC I, HVAC II), DSLCC (HVAC)
Health Sciences	
<i>Diagnostic Services</i>	
Health Technologists and Technicians (other)	DSLCC (Phlebotomy Technician)
Veterinary Technologists and Technicians	BTEC (Veterinary Technology)
<i>Health Informatics</i>	
Medical Secretaries	RoTEC (Medical terminology), Franklin (Medical terminology), VWCC (Medical Office and Billing)
<i>Therapeutic Services</i>	
Registered Nurses	DSLCC (Registered Nursing)
Nursing Assistants	RoTEC (Nurse Aide II), BTEC (Nurse Aide I, II), JRTC (Nurse Aide I, II), DSLCC (CNA), VWCC (Nurse Aide)
Licensed Practical and Vocational Nurses	DSLCC (Practical Nursing)
Pharmacy Technicians	DSLCC (Pharmacy Technician), VWCC (Pharmacy)
Medical Assistants*	VWCC (Medical Assistant)
Dental Assistants	VCWW (Dental)

Information Technology	
<i>Information Support & Services</i>	
Computer User Support Specialists	VWCC (Computer Support and Repair)
<i>Network Systems</i>	
Network and Computer Systems Administrators	RoTEC (Computer Information System, Cybersecurity Fundamentals), BCAT (Computer Systems Technology I, II, Cybersecurity Fundamentals), BTEC (Information Systems Technology I, II, III, Computer Systems Technology I, II, III), FCCC (Computer Syst Tech 1, 2, Networking Essentials), JRTC (Computer Systems Technology I, II, Cybersecurity Fundamentals, Cybersecurity Systems Technology), DSLCC (Cybersecurity, Information Systems Technology)
<i>Programming and Software Development</i>	
Computer Programmers	RoTEC (Programming, Programming - Adv), BCAT (Programming, Programming - Adv), FCCC (Game Design/ Programming), SHS (Programming)
Manufacturing	
<i>Maintenance, Installation, & Repair</i>	
Maintenance & Repair Workers, General	FCCC (General Maintenance I)
Industrial Machinery Mechanics	DSLCC (Industrial Maintenance Mechanic), VWCC (Industrial Maintenance)
<i>Manufacturing Production Process Development</i>	
<i>Includes</i> Industrial Engineering Technicians; Electrical and Electronic Engineering Technicians	BCAT (Manufacturing Systems 1, Manufacturing Systems II Adv), SHS (Manufacturing Systems I, Robotic Design), BTEC (Mechatronics)
<i>Production</i>	
Welders, Cutters, Solderers, & Brazers	RoTEC (Welding I, III), BCAT (Welding I, III), BTEC (Welding I, II, III), Franklin (Ag Fabrication/Welding I), SHS (Welding I, III), JRTC (Welding I, II, III), DSLCC (Welding: Industrial/Structural, Welding: FCAW, Welding: GMAW, Welding: GTAW, Welding: SMAW, Pipe Welding), VWCC (Welding)
Machinists	RoTEC (Precision machining I), VWCC (Machining)
Transportation, Distribution & Logistics	
<i>Facility and Mobile Equipment Maintenance</i>	
Automotive Service Technicians and Mechanics	RoTEC (Auto Tech I, III), BCAT (Auto Tech I, II, III), BTEC (Automotive Technology I, II, III), FCCC (Auto Serv Tech 1, 2), SHS (Auto Tech I, III), JRTC (Auto Tech I, II, III), VWCC (Automotive On-Ramp)

Bus and Truck Mechanics and Diesel Engine Specialists	SHS (Diesel Equipment Technology)
Automotive Body and Related Repairers	BTEC (Auto Body Technology I, II, III), FCCC (Autobody Technology I, II), SHS (Auto Body I, III)
<i>Transportation Operations</i>	
Heavy and Tractor-Trailer Truck Drivers	DSLCC (Commercial Driver's License, Class A), VWCC (Commercial Driver's License)

Note. * RoTEC (Health Assisting Careers), BCAT (Health Assisting Careers), and FCCC (Health Assistant I, II) were assumed to be prerequisite courses and not applied to a specific health occupation (e.g., medical assistant).

Table 3

Program and Workforce Data by High-demand Occupations in Targeted Career Clusters in Virginia LWDA 3

<i>Career Cluster, Pathways and Occupations</i>	High Wage**	2026 Projected Employment	% Growth	# of Enrolled Students*	Annual Job Openings	Enrolled Student to Job Openings Ratio
Architecture & Construction						
<i>Construction</i>						
Carpenters	Yes	1,440	2%	98	130	0.75
Construction Laborers/Building Trades	No	1,214	5%	367	125	2.94
Brickmasons, Blockmasons, Cement Masons, & Concrete Finishers	Yes	342	1 - 4%	83	35	2.37
Electricians	Yes	789	2%	136	87	1.56
Plumbers, Pipefitters & Steamfitters	Yes	631	8%	0	67	0.00
Operating Engineers and Other Construction Equipment Operators	Yes	386	5%	0	42	0.00
<i>Maintenance</i>						
Landscaping and Groundskeeping Workers	No	1,520	13%	19	186	0.10
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	Yes	582	7%	70	58	1.21
Electrical Power-Line Installers and Repairers	Yes	286	15%	0	25	0.00
Health Sciences						
<i>Therapeutic Services</i>						
Nursing Assistants	No	3,388	17%	130	398	0.33
Licensed Practical and Vocational Nurses	Yes	1,422	14%	16	110	0.15
Home Health Aides	No	889	54%	0	112	0.00
Pharmacy Technicians	No	626	10%	52	51	1.02
Medical Assistants	No	616	32%	83*	72	1.15
Dental Assistants	Yes	380	23%	73	45	1.62
Physical Therapist Assistants	Yes	272	29%	0	35	0.00
Manufacturing						
<i>Maintenance, Installation, & Repair</i>						
Maintenance & Repair Workers, General	No	1,870	8%	14	187	0.07

Industrial Machinery Mechanics	Yes	607	6%	34	54	0.63
<i>Production</i>						
Welders, Cutters, Solderers, & Brazers	Yes	928	4%	436	99	4.40
Production Workers	No	720	17%	40	110	0.36
Machinists	Yes	553	-2%	154	54	2.85
Paper Goods Machine Setters, Operators, and Tenders	Yes	440	-2%	0	44	0.00
<i>Quality Assurance</i>						
Inspectors, Testers, Sorters, Samplers, and Weighers	No	470	-12%	0	52	0.00
Production, Planning, and Expediting Clerks	Yes	409	3%	0	41	0.00
Transportation, Distribution & Logistics						
<i>Facility and Mobile Equipment Maintenance</i>						
Automotive Service Technicians and Mechanics	Yes	1,065	4%	303	100	3.03
Automotive Body and Related Repairers	Yes	164	9%	111	15	7.40
Bus and Truck Mechanics and Diesel Engine Specialists	Yes	463	12%	4	44	0.09
Cleaners of Vehicles and Equipment	No	415	8%	0	59	0.00
Mobile Heavy Equipment Mechanics, Except Engines	Yes	278	8%	0	27	0.00
<i>Sales & Service</i>						
Billing and Posting Clerks	No	710	16%	0	74	0.00
<i>Transportation Operations</i>						
Laborers and Freight, Stock, and Material Movers, Hand	No	3,593	10%	0	496	0.00
Heavy and Tractor-Trailer Truck Drivers	Yes	3,422	8%	389	372	1.05
Light Truck or Delivery Services Drivers	No	1,350	10%	0	148	0.00
Industrial Truck and Tractor Operators	No	998	7%	0	112	0.00
Packers and Packagers, Hand	No	568	5%	0	86	0.00
Bus Drivers, School or Special Client	No	497	11%	0	61	0.00

Note. The only inclusion criterion for occupations was 25+ annual job openings/year for high-wage and 50+ annual job openings/year for low-wage. For this analysis, a high-wage career pathway is one in which 60% or more of the occupations in LWDA III had a median annual wage that exceeded the 2018 median annual wage for all U.S. workers (\$38,640; Source: Bureau of Labor Statistics). (Sources: Technical center enrollment or program completion data; Trailblazers: Career and Technical Education in Virginia, <http://ctetrailblazers.org/labor-market-data/>, using Virginia Employment Commission occupational employment projections). *Excludes Health Assistant courses.

A.2 Career & Technical Education Study Plan

Purpose of Study

The purpose of this evaluation study is to 1) conduct an assessment of the current operations, future plans, demands, and needs of career and technical education (CTE) and workforce development programs being offered in the Roanoke Valley and Alleghany Highlands; and to 2) produce recommendations for a research-based direction for CTE programs that meet the business/industry needs of this community.

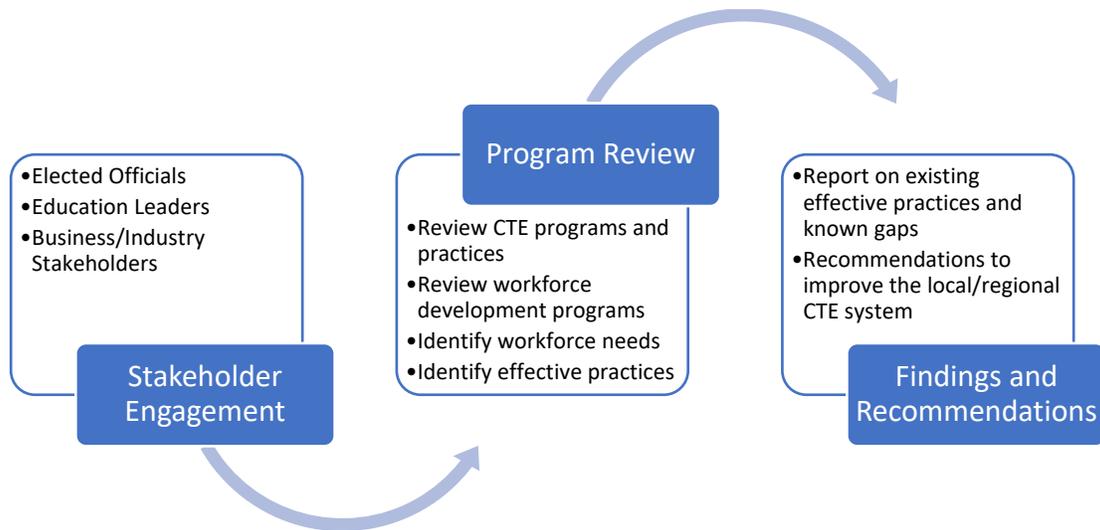
Study Design

This study involves three distinct components following project initiation:

- Stakeholder Engagement
 - o Brief elected officials and other leaders from the education, business, and industry sectors
 - o Collect perceptions of local and regional CTE programs (strengths, weaknesses, opportunities, threats) from these key stakeholders
- Program Review
 - o Identify state and national best/effective practices and programs through review of recent studies on CTE and workforce development programs and practices.
 - o Assess local/regional level current CTE and workforce development programs, including effective practices and programs in providing CTE that meets business/industry needs. Approach requires consultation with local educational leaders and educational facilities on topics including: leadership, program models, curriculum and instruction, facilities/resources, career exploration and guidance, student support and leadership development, industry partnerships, system alignment and responsiveness to changing business/industry demands, organizational design, staffing and professional development, evaluation/accountability/continuous improvement processes, and promotion/outreach. Analyze data on trends in student CTE course enrollment, earned occupational credentials and dual credit, and workplace readiness assessment data (as available).
 - o Identify workforce needs through identification of high- and low-growth industries and occupations at the county and regional levels through consultation with the VVWDB, Virginia Labor Market Information system, industry groups' published information and data, certification standards, and interviews with selected business/industry representatives; analyze other workforce data to gauge long-term demand of industries and occupations.
 - o Identify gaps locally and regionally in CTE programs by comparing labor market needs to current CTE programs.

- Findings and Recommendations

- Prepare report that highlights existing effective practices and known gaps and duplications in CTE programs.
- Prepare recommendations on sustaining and scaling effective practices, eliminating duplications, and introducing new programs to address known gaps to address labor market needs.



Study Tasks

The Shaffer Evaluation Group (SEG) shall perform the following tasks:

Project Administration

TASK 1: Maintain Regular Communications

A project kick-off meeting (virtual) was held with SEG’s project director, senior consultant, the client’s project director, and other key stakeholders. The specific objectives of this kick-off meeting were to:

- Review post-award modifications to the project plan.
- Review key research questions and the high-level plan/tasks and timeline presented in the proposal and discuss and agree upon revisions.
- Identify key stakeholders for engagement in the study. This list may be broadened or reduced as the project commences depending on several factors such as availability of time and staff, different school schedules, and other considerations.
- Identify existing resources supporting this study, including recently completed studies of regional CTE programs.
- Establish the client points of contact and discuss expectations for communications. SEG recommends establishing a regular conference call and/or meeting schedule with the client project director to provide updates on contract activities, receive client updates on related activities, and plan future actions.

- Review and agree upon key deliverables and the review/approval process for deliverables.

At the kick-off meeting, the client and SEG agreed upon the next teleconference and proposed a regular teleconference (or videoconference) for status updates following the town hall meeting (see Task 3a). Dates for these meetings will be scheduled following the review of this study plan.

TASK 2: Prepare Detailed Work Plan

This document—the study plan—provides an overview of the study design, tasks, and timeline, and documents the protocols that will be used for this study. This work plan also describes the approach to informed consent of study respondents (see study plan appendix for consent protocol). As discussed during the kick-off meeting, SEG will prepare a detailed report outline for approval by the WVVDB following the Program Review phase.

Stakeholder Engagement

TASK 3a: Facilitate Town Hall Meetings with Key Community Stakeholders

WVVDB maintains a working relationship with key community stakeholders; therefore, it is their role to determine the primary contacts with business and industry, elected officials and superintendents, and site points of contact. WVVDB will invite appropriate stakeholders to both Town Hall Meetings. WVVDB will provide SEG contact information for specific individuals for follow-up meetings.

SEG will collaborate with WVVDB to facilitate two Town Hall Meetings on February 20, 2020. The first meeting, held at 12:00 pm, will include elected officials and leaders from the education sector. The second meeting, beginning at 2:00 pm, will convene representatives from business and industry. The meetings will provide attendees with an overview of the study and invite them to participate in a discussion about the perceived strengths and weaknesses of, opportunities for, and threats to local and regional CTE programs. During the first meeting, SEG will probe to discover current or in-progress evaluation studies/reports of regional CTE centers and request contact information for facility visits. During the second meeting, questions about short- and long-term demand of industries and occupations will be posed to attendees. Notes from both meetings will be analyzed. Protocols for these discussions are presented in the study plan appendix.

TASK 3b: Follow-up Survey with Town Hall Representatives

Following the Town Hall Meetings, SEG will follow up by survey with attendees to continue the discovery process related to specific components of local and regional CTE programs (see survey in study plan appendix). Work on this follow-up task will conclude by March 13, 2020.

Program Review

TASK 4: Identify State/National Effective Practices and Programs in CTE

An early step in the Program Review phase is to identify and review publications, reports, and other guidance that documents state and national effective practices and programs in CTE and workforce development programs. Knowledge of these effective programs and practices will inform SEG consultants throughout this phase of the work while providing research-based models to inform study recommendations. Also included in this task is a review and assessment of previously completed or current studies of CTE centers in the region under study.

A summary list of resources and effective practices illustrated will be maintained by SEG in a literature scan table that will be appended to the final report. Work on this task will conclude by June 2020.

TASK 5: Assess Local/Regional Level Current CTE Programs

A critical task to this study is the review of existing conditions of CTE centers in the region to determine the degree to which centers are meeting the demand and need of the regional business community. SEG consultants will travel to the region to conduct a 2-day walkthrough analysis of current classrooms/labs at the community college and technical centers listed below.

- Virginia Western Community College
- Dabney S. Lancaster Community College
- Jackson River Technical Center
- Botetourt Technical Education Center
- Arnold R. Burton Technical Center
- Roanoke City Technical Education Center
- Salem High School

This task is a critical step to identifying effective practices, possible duplication, and/or gaps to meeting business/industry needs. As an initial step, SEG consultants will collect available information related to CTE programs, career pathways, and workforce development efforts (terminal degree, degree, and short-term training) from community colleges, tech centers, and division websites and available print materials. These include program offerings from student and parent course selection guidebooks, college courses, and degree plans. Data will be reported as descriptions of current program offerings, individual course names, processed results from checklists, and a narrative of findings.

The Senior Consultant shall reach out to contacts made during the Town Hall for e-introductions to contacts at the building level for the programs/facilities listed above. Site visits, along with visits to business/industry representatives, will be scheduled during a 1-week period in March 2020. At the time of scheduling, the Senior Consultant will request documentation on the CTE facility and programs, websites, school policy documents, reports, and promotional materials, to review in advance of the site visit. Due to time and travel constraints, visits will be limited to a maximum of 3 hours per site.

During the site visit, interview protocols will be used when speaking with CTE leaders, while walkthrough checklists (see study plan appendix) will be used when reviewing classrooms and laboratories. The CTE leadership protocol focuses on programs, student support and

leadership, career exploration and guidance, business involvement and partnerships, and advisory council. The walkthrough checklist was designed to identify items that typically are found in industry. These include equipment age, location, and serviceability; curriculum cues such as workplace posters, signage, production pathways (SIPOC model); classroom agility or how easy it is to rearrange equipment; safety practices, material storage and documentation, presence of local industry tools and processes including job announcements.

A facility assessment report (5-10 pages in length) will be prepared following each site visit and shared with the building-level contact. The intent is to validate SEG's assessments by inviting the facilities to correct inaccuracies and offer additional evidence. Each facility will be offered 2 weeks to respond to the draft assessment report. SEG will review new evidence shared by the facility and update the facility assessment reports as needed. This phase of work shall be completed by April 24.

TASK 6: Identify Workforce Needs

A critical task is to identify workforce needs through meetings with local employers in high-demand industries and workforce data analysis. SEG will request data from WVVWDB records to assist in employer identification, current workforce development priorities, and other pertinent information that is developed locally. SEG will also utilize regional labor force data aligned with career cluster, pathways, and occupations available through Trailblazers, a joint project of the Virginia Department of Education Office of Career, Technical, and Adult Education and the Weldon Cooper Center for Public Service at University of Virginia. In addition, SEG will schedule employer interviews and walkthroughs in key industries during its March 2020 site visit to review workforce needs, equipment and space needs, and typical routines required by the employers (e.g., safety gear). Employers are the best source of information to align secondary and postsecondary workforce readiness and development. For example, a robotics lab might be teaching pick and place robotic systems, yet employers express the need for mechatronic technicians. While there are similarities, employer input is key to identifying current and imminent trends in each industry. Notes organized by organization and contact person will be kept in the project folder and used for analysis in Task 7. This phase of work shall be completed by April 30.

Findings and Recommendations

TASK 7: Summarize Preliminary Findings

Following data collection, SEG will summarize findings from Tasks 3-6. Findings will be organized into three categories: 1) effective CTE practices and programs in the local area and region; 2) duplication in CTE programs if a similar curriculum is offered by more than one provider to the same population; and 3) gaps in workforce training identified as a need by the business/industry sector but not reflected in local or regional CTE programs. These findings will be presented in outline format to the WVVWDB prior to a discussion meeting between the SEG senior team and the WVVWDB team. In addition to validating the findings, SEG and WVVWDB will discuss potential recommendations to include in the report. The findings outline will be submitted to WVVWDB no later than June 1; the discussion meeting will be scheduled no later than June 12.

TASK 8a: Report Findings

A first draft of the final report will be delivered to the WVVDB by July 13, 2020, with results from all scope of work activities and recommendations for activities to be implemented to further streamline CTE programmatic activities as well as how to better align current and future programs with business need in high-demand industries. Following feedback from WVVDB, the final report will be submitted by July 27, 2020.

Report content and format shall be finalized during Task 7, but minimally SEG expects to include the following content:

- Analysis of research on alignment with business and industry needs;
- Evaluation of gaps or duplication between existing CTE Programs and pathways to college and careers found in the identified schools;
- Recommendations for sustaining and scaling effective practices, eliminating duplications, and introducing new programs to address known gaps to address labor market needs;
- Determination of alignment of career pathways within various industries;
- Research on best practices or case studies of regional CTE Centers and/or Programs that serve multiple school systems;
- Descriptors of the alignment of the regional CTE Centers with community colleges and business and industry;
- Identification of virtual programmatic activities:
- Identification of and/or proposed solutions for mobile equipment labs.

TASK 8b: Present Findings

Communicating the results of the study is equally important to the content of the report. SEG is available to support delivery of the report to key stakeholders during August 2020. Minimally, we recommend presenting findings to the stakeholders who were engaged in the earlier part of this study. We have budgeted 2 days for presentations.

Study Timeline

SEG proposes coinciding data collection for Tasks 5 and 6 with school calendars. This would include the weeks of March 9 or April 19.

Task #	Activity	Completion Date
Project Administration		
1	Kick-off meeting	29-Jan-20
2	Detailed Work Plan	12-Feb-20
Stakeholder Engagement		
3a	Facilitate Town Hall Meetings with Key Community Stakeholders <i>Site visit: Feb. 20, 2020</i>	20-Feb-20
3b	Follow-up Discussion with Selected Representatives	13-Mar-20
Program Review		
4	Identify State/National Effective Practices and Programs in CTE	20-May-20
5	Assess Local/Regional Level Current CTE Programs <i>Site visit (Feb. 20, 2020)</i>	24-Apr-20
6	Identify Workforce Needs <i>Site visit (Feb. 20, 2020)</i>	30-Apr-20
Findings and Recommendations		
7	Summarize Preliminary Findings	12-Jun-20
8a	Report Findings	27-Jul-20
8b	Present Findings <i>Site visit: To be determined</i>	30-Aug-20

Study Plan Appendix: Protocols/Instruments

A. Consent Protocol – Employers

The following consent protocol will be used during the Town Hall Meetings, site visits, and interviews with individual representatives.

Thank you for taking time to speak with us today about this career and technical education study supported by the Western Virginia Workforce Development Board. The purpose of this study is to assess the current operations, future plans, demands, and needs of career and technical education programs being offered in the Roanoke Valley and Alleghany Highlands. This assessment includes programs offered at both the secondary school level as well as post-secondary educational institutions. By July 30, 2020, a final report will be delivered to the WVWDB with findings from our data collection and recommendations for activities to be implemented to further streamline career and technical education programmatic activities as well as how to better align current and future programs with business need in high-demand industries.

My name is _____, and I am a [position] with Shaffer Evaluation Group, which was contracted by the Western Virginia Workforce Development Board to conduct this study. Your participation in this study is totally voluntary, and you may stop participating in this conversation at any time without negative consequences. If you would like to withdraw anything shared today or offer other information after today's meeting, you're welcome to email me. We will honor requests to hold information shared in confidence.

I am audio-recording today's discussion for the purpose of transcribing your comments for analysis. The audio-recording will be destroyed after I write up the notes, and the notes won't include your name. Are you okay with being recorded?

Additional protocol for the Town Hall Meetings:

Before we begin our conversation, I have some group norms that I am asking each of you observe:

1. First, respect everyone's point of view. I don't expect you to agree with one another about everything, and there are no right or wrong answers to my questions. Everyone's contributions are valuable.
2. Because your comments are being recorded and transcribed, I need one person to speak at a time. You do not have to raise your hand; just wait until the person who is speaking stops before you begin.
3. Finally, please do not repeat or discuss comments made during this session with others. Please do not repeat or discuss with other students/staff what members of your group may say. If you are asked, you may say that the group talked about ways to improve student learning, but please keep specific remarks confidential.

Did you have any questions for me before we begin?

B. Consent Protocol – Schools

Thank you for taking time today to tell us about your CTE programs for the Western Virginia Workforce Development Board study.

My name is _____, and I am with Shaffer Evaluation Group, who is the contractor for the study.

The purpose of this study is to assess current operations, plans, demands, and needs of CTE programs in the Roanoke Valley and Alleghany Highlands, including programs offered at both secondary and post-secondary schools. Our findings and recommendations will be reported to the workforce board by July 30, 2020.

Your participation in this study is totally voluntary. You may stop at any time without negative consequences. If you would like to withdraw anything shared today or offer additional information, please email me. We will honor any requests to keep confidential any information shared.

I would like to record our discussion so I can make sure I have all your comments. The recording will be destroyed after I write up the notes, and the notes won't include your name. Are you okay with being recorded?

Do you have any questions for me before we begin?

C. Elected Officials and Leaders from the Education Sector (first Town Hall Meeting) Questionnaire

These questions are designed to identify the Strengths, Weakness, Opportunities, and Threats (SWOT) related to local and regional CTE programs, Technical Centers, and Community College Workforce Development programs. Together, I will call these CTE programs for brevity. You might want to think in terms of people, facilities, physical locations, funding, value to families, students, industry, and the region as a whole. Factors could be: internal to the schools or region or external, in your control or not in your control (e.g., Regulations).

Strengths—those qualities we have as a division that make us strong

- What are the strengths of the CTE programs?
- What are the indicators of success?
- What resources are available?
- What should be left alone?

Weaknesses—those qualities within our region that work against student success and industry needs

- What are the weaknesses of local and regional CTE programs?
- How can local and regional CTE Programs improve or be improved?

- What resources are lacking?
- What should change?

Opportunities—those chances outside the region we can capitalize on

- What potential external factors could be developed or used to support local and regional CTE programs?
- What untapped resources exist that could be used to support local and regional CTE programs?
- What programs should be offered?

Threats—to making the changes necessary to support students

- What external obstacles prevent success to CTE programs?
- What programs should be changed?
 - How should they be changed?

Additional Questions

- Are there any current or in-progress evaluation studies/reports or regional CTE centers of which we should be aware?
- Is there anything else you would like to add that has not been discussed?
- Please provide contact information for follow-up conversations and/or to arrange a facility visit.

D. Business and Industry Stakeholders (second Town Hall Meeting) Questionnaire

These questions are designed to identify the Strengths, Weakness, Opportunities, and Threats (SWOT) related to local and regional CTE programs, Technical Centers, and Community College Workforce Development programs. Together, I will call these CTE programs for brevity. You might want to think in terms of people, facilities, physical locations, funding, value to families, students, industry, and the region as a whole. Factors could be: internal to the schools or region or external, in your control or not in your control (e.g., Regulations).

Strengths—those qualities we have as a division that make us strong

- What are the strengths of the CTE programs?
- What are the indicators of success?
- What resources are available?
- What should be left alone?

Weaknesses—those qualities within our region that work against student success and industry needs

- What are the weaknesses of the local and regional CTE programs?
- How can local and regional CTE Programs improve or be improved?
- What resources are lacking?

- What should change?

Opportunities—those chances outside the region we can capitalize on

- What potential external factors could be developed or used to support local and regional CTE programs?
- What untapped resources exist that could be used to support local and regional CTE programs?
- What programs should be offered?

Threats—to making the changes necessary to support students

- What external obstacles prevent success to CTE programs?
- What programs should be changed?
 - How should they be changed?

Additional Questions

- How have CTE programs met the short-term demand of industries and occupations, locally and in the region?
- How have CTE programs met the long-term demand of industries and occupations, locally and in the region?
- Is there anything else you would like to add that has not been discussed?
- Please provide contact information for follow-up conversations.

Additional Questions:

- What do you think the greatest workforce needs will be in the future, say 10 years from now?
- Are CTE programs aligned with the current high-skill, high-wage, and/or in-demand careers? Why or why not?
- What should CTE programs continue or sustain to meet current and future workforce needs?
- How can CTE programs improve to be better suited for the needs of the workforce?

E. Employer Walkthrough Protocol

Question
Name of Business
Interviewee
Location
So, please help us by giving us an overview of _____ (your business).
How many people do you currently employ?
How many unique job descriptions does your company have? May we have a copy of the job descriptions or titles with the job qualifications?
Thinking of capacity, how many employees do you need now and in which jobs?
Does _____ (your company) have plans for expansion in the next 10 years or so?

How will the next 10 years or so impact the number of employees you will need? Will additional jobs require different job descriptions than what you have now? Please explain.
Do you require or prefer to hire employees with industry licenses, certifications, or other credentials? Which ones?
Are you aware that Virginia has a Workforce Readiness certificate for high school students and a Career Readiness certificate for Community College students and trainees? If yes, how important are these certificates to your hiring process?
Do you or your staff recruit employees directly from any of the schools in the area? Which ones?
What types of equipment does your company use that requires training before you hire?
Do you provide new or modern equipment for any of the region's schools? Which ones and what equipment?
Do you or a member of your staff serve on any of the school's CTE or workforce development advisory committees? Which ones?
Do you have students who work onsite at your jobsite as employees?
How many students work for you full time? Part time?
Do you have agreements or student work-based learning or experiences between your company and high schools, technical center, or community colleges?
Do you participate in any of the following for high school or community college students (list CC separate from HS)?
<ul style="list-style-type: none"> • Registered apprenticeships, including pre-apprenticeships? • Apprenticeships, not including pre-apprenticeships and registered apprenticeships? • Other interactions with high school students? Probe for career mentorships; career-related competitions; cooperative education; field trips or tours of your facilities; informational interviews; job shadowing; mentorship; paid or unpaid internships; school-based enterprises; service learning; student-led enterprises
What are your expectations for Career and Technical Education in high school?
What are your expectations for Career and Technical Education in community college?
How should students be prepared to enter your workforce?
What key knowledge, skills, and attitudes do you seek?

F. CTE Leadership Interview Protocol

School:	Date:
School Division:	
CTE Program:	
<i>Request the following documents: Local Perkins plan, list of CTE advisory committee members, link to course catalog, CTE advisory committee minutes for past two meetings, and two years of CTE course enrollment data, earned occupational credentials and dual credit, and workplace readiness assessment data (as available).</i>	
Leadership Questions	Evidence
What are the strengths of your CTE programs? What are the indicators of success?	
What are the weaknesses of the local CTE programs?	
How can local CTE Programs improve or be improved? What resources are lacking?	
What external obstacles prevent success to the CTE programs?	
What programs should be changed? How?	
What potential external factors could be developed or used to support local CTE programs? What untapped resources exist that could be used to support local CTE programs?	
What external obstacles prevent success to CTE programs?	
CTE Advisory Council/Industry Partnerships	
Let's discuss the role of your CTE Advisory committee. <ul style="list-style-type: none"> - Connections to employers - Work-based learning experiences - Family/parent involvement - Participation in programs - Engagement with teacher professional development 	

Programs	
Discuss programs, how they meet local economic needs, and program models, including: -Career Academy, National Academy Foundation (NAF), or Linked Learning?	
-Apprenticeship?	
-Employer Work-based Learning or Training Model?	
-Virtual Learning (internet-based)?	
-Other (describe in the comments)?	
Career Exploration and Guidance -Discuss approach to CTE student counseling and career planning	
Student Support and Leadership Development -Discuss how student leadership is cultivated -Discuss how program meets needs of special populations (e.g., ELL)	
System Alignment -Discuss existing program partnerships/vertical alignment with postsecondary institutions	
Organizational Design -Discuss opportunities for better use of after-school, out of school time for career exploration -How is education and training provided at locations and times convenient to both students and employers? -Discuss any transportation issues	
Responsiveness to Changing Demands -Discuss how division tracks local business/industry needs and responds accordingly -Discuss course demand (enrollment)	

Source: CTE Resource Center, Henrico County Public Schools (n.d.). *CTE Local Advisory Committees: The Key to Strong, Successful Business/Industry Partnerships*. Virginia Department of Education.

G. Facility Walkthrough Checklist

School Name:			
Classroom/ Laboratory:			
Instructor:			Date:
Item #	Description	YES	NO
A	Does the Lab/ Classroom have: [observations only]		
1	Clear signage (demonstrates organization)?		
2	Identifiable workflow?		
3	Employer information (job postings, job requirements, etc.)?		
4	Appropriate career messaging (pictures and posters of incumbent workers)?		
5	Adequate ventilation?		
6	Agility (able to be rearranged for different projects)?		
B	Is the Lab/ Classroom Equipment: [observations only]		
1	In serviceable condition?		
2	Similar to industry equipment?		
3	Area clean and neat (no clutter, obviously maintained, etc.)?		
4	In logical locations (not sporadically located)?		
5	Are simulators present?		
C	Are Materials: [observations only]		
1	Stored in a logical location (SIPOC)?		
2	Appropriate to or similar to industry materials?		
D	Are Classroom/ Lab Processes: [observations only]		
1	Clearly posted?		
2	Obviously organized and managed?		
3	Documented?		
E	Is Lab/ Classroom Technology: [observations and questions]		
1	Up to date (less than 5 years old)?		
2	Appropriate to the industry pathway?		
3	Appropriate to industry standards?		
4	Appropriate to industry credentials (licenses, certifications, etc.)?		

Sources: High Quality Career Technical Education in Massachusetts: A Critical Investment in Our State's Future https://www.worcesterchamber.org/wpcontent/uploads/2018/03/AVTE-White-Paper_FINAL-2.8.18-1.pdf
 Personal Protective Equipment, United States Department of Labor <https://www.osha.gov/SLTC/personalprotectiveequipment/>

Virginia's All Aspects of Industry <http://www.cteresource.org/featured/aai.html>

Virginia Creating Excellence Awards Criteria (2020) http://www.doe.virginia.gov/instruction/career_technical/index.shtml

Virginia Administrative Code: 8VAC20-120: CHAPTER 120 Regulations Governing Career and Technical Education
 Virginia's Workplace Readiness Skills: Framework for the Future (2017).

http://www.doe.virginia.gov/instruction/career_technical/workplace_readiness/wrs-research-report.pdf

H. Follow-up Survey

Survey

Shaffer Evaluation Group is conducting a regional study to assess current operations, future plans, demands, and needs of career and technical education and workforce development (CTE) programs in the Roanoke Valley and Alleghany Highlands. This region includes the following jurisdictions: Alleghany County, Botetourt County, Craig County, Covington City, Franklin County, Roanoke City, Roanoke County, and Salem City.

Please assist us in this study by providing your input. This survey should take approximately 10 minutes. All input will be made available for review to participants. Your name will not be revealed in any report of this information other than recognition for participation.

* 1. Which of the following best describes you?

Elected Official

Education Leader

Business/Industry/Economic Development Stakeholder

Citizen

Other (please specify)

2. What is the name of the organization that you represent?

3. What is your name? (optional)

4. What is your e-mail address? (optional)

* 5. In what jurisdiction do you live?

Alleghany County

Botetourt County

Craig County

Covington City

Other (please specify)

Franklin County

Roanoke City

Roanoke County

Salem City

SWOT Analysis

Strengths, Weakness, Opportunities, and Threats (SWOT) related to local and regional CTE programs, Technical Centers, and Community College Workforce Development programs.

6. STRENGTHS-

Share your perceptions of the strengths of local and/or regional CTE programs. As you write your response, please consider these questions:

- What are the strengths of the local and regional CTE programs?
- What are the indicators of success?
- What resources are available?
- What should be left alone?

7. WEAKNESSES-

Share your perceptions of the weaknesses of local and/or regional CTE programs. As you write your response, please consider these questions:

- What are the weaknesses of the local and regional CTE programs?
- How can local and regional CTE programs improve or be improved?
- What resources are lacking?
- What should change?

8. OPPORTUNITIES-

What opportunities exist for local and/or regional CTE programs? As you write your response, please consider these questions:

- What potential external factors could be developed or used to support local and regional CTE programs?
- What untapped resources exist that could be used to support local and regional CTE programs?
- What programs should be offered?

A.2 Career & Technical Education Study Plan

9. THREATS-

Share your perceptions of threats to local and/or regional CTE programs. As you write your response, please consider these questions:

- What external obstacles prevent success to the local and regional CTE programs?
- What programs should be changed?
- How should they be changed?

Additional Questions

10. Do you have any other comments you would like to share?

A.3 Literature Scan

Resource Title	Author(s)	Publication Date	Overview/Abstract	Relevant Findings
Career Exploration in Middle School: Setting Students on the Path to Success	Association for Career & Technical Education (ACTE)	2018	Publication provides recommendations to engage middle schools in career exploration at the local level.	Provides CTE courses in middle school to help students explore within the 16 Career Clusters® of the National Career Clusters Framework®, engaging students in identifying careers of interest and developing employability skills. Provides courses that vertically align with specific CTE programs of study in nearby high schools. VDOE's regulation requiring an academic and career plan by 7th grade is noted as an effective practice.
How Massachusetts Vocational Schools Are Preparing Students for College and Careers	Achieve Organization	June 2015	Career and technical education in Massachusetts uses a multipronged system consisting of: 1) regional vocational schools, 2) district vocational schools, and 3) embedded career and technical programs. Regional vocational schools are stand-alone schools that operate as an independent school district, drawing students and funds from neighboring communities and answering to their own school committee and local advisory board. District vocational schools are stand-alone vocational schools that operate under the auspices of individual school districts. The schools answer to their district school committee and an independent advisory board. Embedded career and technical programs operate within public schools. These programs include elective tracks embedded within comprehensive schools and themed academics as well as programs designed for students with significant disabilities.	The effective practices from this article are organizational in nature. Massachusetts developed relevant career and technical standards that aligned with the changing needs of the workforce, but also integrated the English language arts and mathematics requirements. Massachusetts offers CTE in two paths: students can either take specialized programs embedded in comprehensive high schools or attend regional vocational and technical schools (RVTS). Both paths allow students to graduate with options, enroll in post-secondary education, or go directly into the workforce. The state is committed to consistently updating the career and technical standards, and has revised them multiple times since 2000 to reflect the changing landscape. For example, at one school, local industry advisors review the curricula twice annually to ensure the skills students are learning match the current industry standards. In order to meet both state curriculum standards and the added-on career and technical curriculum, Massachusetts schools have been flexible with scheduling and instructional time. For example, a RVTC offers CTE courses during one rotation and academic courses during the next rotation.
CTE On the Frontier: Catalyzing Local Efforts to Improve Program Quality	Advance CTE	2017	This series focuses specifically on access to high-quality CTE in rural communities, identifying strategies to strengthen the rigor, breadth, and quality of rural career pathways at both the K-12 and postsecondary levels. Although some	Some of the challenges with high-quality rural CTE delivery include ensuring that all programs are responsive to employer needs and that secondary and postsecondary programs are aligned. Issues of quality are not exclusive to rural settings—ensuring that CTE programs are high quality is critical to the success of a

			<p>states have larger rural populations than others, the National Center for Education Statistics reports that every state serves learners in rural school districts and institutions, making the delivery of high-quality career pathways in rural communities a shared national challenge.</p>	<p>statewide career readiness strategy—but the nature of CTE delivery is different in rural institutions, which may necessitate a more focused strategy. Based on successes in Nebraska, South Dakota, and Idaho, the authors recommend three approaches to effectively catalyze local innovation and promote high-quality career pathways in rural communities: 1) leverage federal and state funds to fuel local innovation, using state criteria as guidelines for quality; 2) provide meaningful technical assistance and other supports to help program administrators identify solutions; 3) take a regional approach to designing or upgrading programs to ensure that they are responsive to local needs.</p>
<p>Aligning to Opportunity: State Approaches to Setting High Skill, High Wage and In Demand</p>	<p>Advance CTE</p>	<p>January 2020</p>	<p>The strengthening Career and Technical Education for the 21st Century Act (Perkins V) places a strong emphasis on the alignment of CTE programs of study with state, regional, and local economies. Specifically, the legislation requires Perkins-funded programs to prepare students for "high-skill, high-wage, or in-demand occupations." State and local recipients can no longer merely declare that their programs are responsive to employer demand but now must use labor market information (LMI) to demonstrate the alignment of programs to high-skill, high wage, and/or in-demand careers. States are grappling with the following questions: How would they define high skill, high wage, and in demand? Which data sources should they use to make determinations about whether programs meet one or more of the criteria, and what assistance should be provided to local applicants in accessing and using data? Should they provide flexibility for eligible recipients whose programs do not meet the criteria, and how should flexibility be provided? How can information on CTE program alignment with LMI be disseminated publicly and promoted specifically to learners and families?</p>	<p>An emerging strategy among states is to collaborate with other agencies throughout to align CTE programs with state, regional, and local economies. This collaboration allows for expertise from economic and workforce agencies to be included. It is crucial for state or regional CTE programs to have specific definitions for high skill, high wage, and in demand, and keep these definitions current. For example, Washington, DC, defined <i>high skill</i> as those occupations located within the DC metropolitan area with education or training requirements (e.g., completing an apprenticeship program, completion of an industry-recognized certification or credential; associate degree, or higher); <i>high wage</i> was defined as occupations with 25th percentile wage equal to or greater than the most recent MIT Living Wage Index for one adult in the DC region and/or occupations that lead to a position that pays at least the median hourly or annual wage; and <i>in demand</i> was defined as occupations in the DC area having more than the median number of total (growth plus replacement) annual openings over a 5-year period.</p>

<p>High Quality Career Technical Education in Massachusetts: A Critical Investment in Our State's Future</p>	<p>Alliance for Vocational Technical Education (AVTE)</p>	<p>March 2018</p>	<p>Unlike many of their counterparts across the nation, Massachusetts vocational technical schools are highly regarded as a CTE success story. These achievements can be attributed to high expectations and an initial investment in CTE and education in general. The Massachusetts Education Reform Act of 1993, commonly referred to as "the grand bargain," was the driving force behind the state's high quality CTE and other educational achievements. The Act promulgated the simultaneous adoption of challenging state standards and a means-tested state finance system.</p>	<p>Massachusetts identified six elements of high quality CTE: 1) alignment with labor market demands, 2) career counseling, 3) technical coursework, 4) work-based learning, 5) credential attainment, and 6) post-secondary links.</p>
<p>Denver Snags \$7 Million Investment To Prepare Underserved Young People For The Future Workplace</p>	<p>Brundin</p>	<p>February 2020</p>	<p>Denver will receive a \$7 million investment over 5 years to help prepare young people for the future of work.</p>	<p>Denver will join 9 other cities in implementing programs to tackle youth unemployment and expand access to underserved young people in high school as part of JPMorgan Chase's global skills readiness initiative. With the funds, Denver Public Schools, Metro State University, the University of Colorado Denver, and others can collaborate to continue to expand underserved students' access to higher education and work experiences that lead to high-wage, in-demand jobs in fields like business, advanced manufacturing, healthcare, and cyber-security.</p>
<p>Construction apprentice programs face new COVID-19 learning curve</p>	<p>Buckley & Rubin</p>	<p>May 2020</p>	<p>The article describes the unique challenges of running construction apprentice programs during COVID-19 and details some innovative solutions.</p>	<p>Given the strong imperative to restart programs, some providers switched to some online education and testing, while others utilized take-home kits to allow students to continue learning while staying at home. Moving classroom training outside was another option, with students showing up on class days at staggered times for briefings. Health checks will also take place before class meetings.</p>
<p>A Course of Study: Creating a Standards-Aligned Career Technical Education System</p>	<p>California County Superintendents' Education Services Association</p>	<p>2010</p>	<p>Developed in California, this guide is aimed at providing a framework for teachers and administrators to integrate the critical components of an effective stands-aligned CTE program.</p>	<p>The California State Plan for CTE establishes the vision, goals, and essential elements of a world-class CTE system. A high-quality CTE system includes 11 elements: 1) Leadership at all levels; 2) High-quality curriculum and instruction; 3) Career exploration and guidance; 4) Student support and student leadership development; 5) Industry partnerships; 6) System alignment and coherence; 7) Effective organizational design; 8) System responsiveness to changing economic demands; 9) Skilled faculty and professional development; 10) Evaluation, accountability, and</p>

				<p>continuous improvement; and 11) CTE promotion, outreach, and communication.</p>
<p>California Department of Education Career Technical Education 11 Elements of High-Quality CTE Program Self Review Tool</p>	<p>California Department of Education</p>	<p>September 2015</p>	<p>The California State Plan for CTE, approved in March 2008 by both the State Board of Education and the Board of Governors of the California Community Colleges, establishes the vision, goals, and essential elements of a world-class CTE system for the State of California. The authors of the plan identified the 11 Elements of a High Quality CTE system that must be present to ensure that California can realize its goals of preparing all students for the future and ensuring a strong economy. California's career and college readiness organizations develop CTE pathways, sequences of courses, and classes with these principles.</p>	<p>California identified 11 elements of high quality CTE and updated this list in 2015. 1) Leadership at all levels (articulation agreements, professional development, and support at all levels); 2) High quality curriculum and instruction (pathway standards, sequenced career pathways, work-based learning, master schedule sequencing, all aspects of industry taught, technology embedded, academic alignment, industry certification/licensure); 3) Career exploration and guidance (students counseled/guided, develop 4-year career plan); 4) Student support and student leadership development (career technical student organizations [CTSO], CTSO work plan, leadership activities embedded in curriculum, all students participate, special population students aware, non-traditional CTE offerings); 5) Industry partnerships (advisory committees, business/ industry participation, industry approved curriculum, labor market demand, industry standards/ competencies); 6) System alignment and coherence (program of study to postsecondary, cross-disciplinary collaboration, program sequence includes at least one CTE course); 7) Effective organizational design (course access: extended time, open entry opportunities in sequence, convenient times/locations); 8) system responds to economic demands (track labor market demands, sufficient funding for program, partnerships with stakeholders); 9) Skilled faculty and professional development (appropriate teacher credentials, professional development activities, CTE staff meetings, record of staff meetings); 10) Evaluation, accountability, and continuous improvement (industry advisory committee, annual course reviews, classroom observations, teacher evaluations, yearly strategic planning); 11) CTE promotion, outreach, and communication (community outreach activities and workshops, student leadership opportunities, community classroom/internships, career technical student organizations, work/project based learning, community service projects, industry advisory committees, open house, classroom/teacher websites, media promotion of events, community involvement participation).</p>

<p>Plan for Career Technical Education (CTE) Academy</p>	<p>Central Virginia Community College (CVCC)</p>	<p>February 2019</p>	<p>Officials at CVCC announced a grant award to the college that will provide an opportunity for students to earn a skill-based credential to meet specific employer in-demand job requirements.</p>	<p>The Get Skilled, Get a Job, Give Back Initiative (or G3 Capacity Building Grant) will be used to support planning efforts for a regional CTE Academy for dual enrollment students, recent high school graduates, and unemployed or underemployed adults to earn credentials for targeted industry employment sectors. CVCC will work closely with the Virginia Community College System office to establish a standard, system-wide G3 student onboarding process that begins with the "One Door" advising model and includes eligibility determination, FAFSA completion, domicile establishment, program orientation, community service commitment tracking, and providing needed student support services.</p>
<p>Advancing Career and Technical Education (CTE) in State and Local Career Pathways Project: Final Report</p>	<p>Clagett</p>	<p>December 2015</p>	<p>America's economic future, the prosperity of its citizens, and the success of its employers increasingly depend on the education and skills of the workforce. However, the education and skill levels of American youth and adults are not keeping pace with today's global economy. The Center on Education and the Workforce at Georgetown University projects that 65% of domestic jobs will require post-secondary education and training in 2020 and the United States will face shortages of 3 million workers with Associate's degrees or higher and 5 million workers with technical certificates and credentials. Despite this dire need for skilled workers, approximately 35% of Americans over 25 do not have any post-secondary education or training.</p>	<p>Accomplishments from the Advancing CTE project include: the inclusion of state and local CTE systems in broader Career Pathways system development efforts; coordinated use of labor market information to identify high-demand industry sectors and occupations upon which to build education and training systems; implementation of coordinated employer engagement strategies—including industry sector partnerships—that increase business buy-in and pathways development; development of coordinated and enhanced counseling and navigation efforts, including pathways mapping; development of comprehensive career pathways in high-demand occupations, especially in advanced manufacturing and healthcare fields, beginning in secondary school and continuing to and through post-secondary education and training and resulting in industry-recognized credentials; initiation of alternative funding approaches; and creation of common data and performance metrics.</p>
<p>Opportunities and Options: Making Career Preparation Work for Students</p>	<p>Council of Chief of State School Officers (CCSSO)</p>	<p>November 2014</p>	<p>Most states and school systems are working toward the goal of getting their students "college and career-ready," but what we mean by "career-ready" is not always clear, and the supply of quality CTE programs has not kept pace with demand. Career education in too many secondary schools reflects an outdated model that tolerates low expectations and is often misaligned with the evolving needs of the current labor market. The result: an increasingly pronounced skills</p>	<p>This report identified 3 recommendations or sets of actions states must take to transform their schools' approach to career readiness. First, states must make their high school programs more responsive to the labor market by enlisting the employer community as a lead partner. States need a new "demand-driven" system for determining which programs and pathways warrant continued development and investment and which should be scaled down or phased out. Second, states must significantly raise the threshold for quality career pathways in secondary schools. States must develop and make available to all students an array of high-</p>

			<p>gap that plagues American businesses as they struggle to find qualified workers and dead ends for students who rely on career preparation programs as “an opportunity to secure high-wage careers” or something similar. CCSSO launched its Career Readiness Task Force in spring 2014 to bring a renewed focus to this issue. The task force—composed of state school chiefs, post-secondary leaders, business leaders, and CTE experts—analyzed leading career preparation practices in the US and abroad and identified specific policies states must adopt to dramatically improve the preparation of their high school graduates.</p>	<p>quality career pathways, spanning secondary and post-secondary levels, that combine rigorous academics with an applied curriculum and work-based learning opportunities. These pathways can no longer be treated as less rigorous than those that prepare students for college; rather, they must be as rigorous as the college-prep track and result in credentials that are valued by employers and align with current and emerging market needs. Third, states must make career preparation matter to schools and students. Given the critical role that accountability systems play in signaling priorities and driving resources, states must expand these metrics to emphasize readiness for both college and careers. For example, states need to reconsider high school graduation requirements to give credit for career-focused courses and credentials.</p>
<p>Virginia's Workplace Readiness Skills: Framework for the Future</p>	<p>Crespin</p>	<p>September 2017</p>	<p>The purpose of this research project was to evaluate Virginia's current set of 21 Workplace Readiness Skills—adopted by the Virginia Board of Education in 2010 for inclusion in the curriculum of every state CTE course—to be certain they are up-to-date and aligned with the modern-day needs of employers. Please note that these Skills were further updated in 2019-2020 and recommended changes were adopted.</p>	<p>Virginia's Workplace Readiness Skills are a set of personal qualities, people skills, and professional abilities identified by Virginia employers and educators as essential for employee success in the workplace. The authors found that six major workplace trends will continue to have a significant influence on the changing needs and demands of the workplace: 1) Information reevaluation, 2) Automation, 3) Globalization, 4) Rapid and continuous innovation, 5) Organizational restructuring, 6) time and power shifting. The authors recommend changes to the "skill domains." Recommendations include: Change <i>Personal Qualities and People Skills</i> to <i>Personal Qualities and Abilities</i>; change <i>Professional Knowledge and Skills</i> to <i>Interpersonal Skills</i>; and change <i>Technology Knowledge and Skills</i> to <i>Professional Competencies</i>. Other recommendations include adding <i>Initiative and self-direction</i>; changing <i>Information Technology/Telecommunications</i> to <i>Information Technology</i>; renaming and redefining the skill <i>Integrity/Positive Work Ethic/Self-Representation</i>, and broader definitions for <i>Health and Safety/Job Acquisition and Advancement/Lifelong Learning</i>.</p>
<p>CTE Courses Transform for Online Learning</p>	<p>De La Rosa</p>	<p>May 2020</p>	<p>The article provides examples of how CTE teachers developed novel approaches to instruction during the COVID-19 pandemic.</p>	<p>The closure of schools due to COVID-19 forced CTE teachers to think creatively about how to provide instruction. In addition to lesson and idea sharing with peers, teachers developed novel approaches to online learning. For example, nursing teachers created videos</p>

				of themselves giving dolls baths to demonstrate bed bathing techniques. In some states, such as Colorado, small group instruction was permitted. Welding classes could continue since the protective gear worn by students and the nature of the practice made for relatively easy social distancing.
Blended Learning vs. Virtual Learning in Career and Technical Education	Edmentum	February 2019	The article provides a high-level overview of approaches to blended and virtual learning in CTE.	There are 2 primary ways to deliver online CTE programs: blended learning and virtual learning. Blended learning refers to a formal education program in which a student learns in part through online learning with some control over time, place, and path, and in part through a more traditional, in-person, supervised classroom. This approach works best with an instructional staff who have experience and credentials in CTE fields and a well-established program. Virtual learning, offered fully online using a provider such as EdOptions Academy, is appropriate for those with limited budget and staffing resources and a small population of students interested in a CTE program. Edmentum offers over 100 semester-long CTE courses—available with or without a certified teacher—across all 16 nationally recognized Career Clusters.
Work-based Learning: Model Policy Components	Education Commission for the States	2018	Publication describes the key model components to support work-based learning at the state or regional level, including state and regional coordination, access, finance, program quality, and graduation credit.	Six strategies are identified as critical for regional coordination: 1) Develop a single, clear definition for all CTE experiences that enables all stakeholders to have a clear understanding of each type of CTE experience; 2) develop a CTE strategic plan that includes regional priorities that align with high-demand jobs and employer priorities; 3) identify a designated entity or entities to be a part of the coordination efforts, such as the local board of education and the governor's office; 4) establish regional intermediaries that provide the link between districts and employers; 5) develop effective employer outreach and support strategies; and 6) communicate clearly on critical employer logistics is an integral component of regional planning.
Putting Career and Technical Education to Work for Students: A Playbook for Policymakers	Excel in Ed	November 2017	Unfortunately, too many state CTE programs are not fulfilling the promise of improving students' career readiness, expanding their access to postsecondary credentials, or providing opportunities for long-term advancement and success in the workforce. Despite the longevity and importance of these essential programs,	High quality CTE Program Non-Negotiables: 1) All promoted programs of study align with state and/or regional industry and labor market; 2) Programs of study incorporate experiential learning and capstone experiences valued by industry; 3) Secondary programs of study vertically align with post-secondary programs; 4) Courses are sequential and progressive in a given program of study; 5) Secondary programs of study

			many do not align with regional workforce needs or provide clear pathways to careers.	incorporate courses and exams eligible for post-secondary credit or hours where appropriate; 6) Course standards are robust and accurately represent the academic, technical, and employability skills learners must master; 7) Educators receive ongoing, progressive training and professional development to ensure their instruction is reflective of course standards and current industry work environments; and 8) Federal, state, and local funding are used to leverage and drive programmatic changes, leading to the implementation of vertically aligned education-to-career learning pathways.
CVCC, educators celebrate grant to help launch CTE academy	Faulconer	20-Feb-19	CVCC and Amherst County Public Schools Superintendent Rob Arnold recently joined in announcing a grant award to the college that will support planning efforts for a regional CTE Academy.	Developed in partnership with Amherst County Public Schools and other school divisions in the Lynchburg area, this academy based at CVCC will serve dual-enrollment students, recent high school graduates, and unemployed or underemployed adults to earn credentials for targeted, high-demand industry employment sectors. The academy will use programs such as precision machining and welding while expanding the college's offering of courses, most notably in trades such as plumbing, construction, and industrial maintenance. An important element of this academy is the establishment of a standard system-wide G3 student onboarding process that begins with the "One Door" advising model and includes eligibility determination, FAFSA completion, domicile establishment, program orientation, community service commitment tracking, and student support services. The college and its partners secured a G3 grant award of \$267,181 to establish the academy; G3 funds are administered for Virginia's community colleges by VCCS. G3 grant-funded priorities include salaries for a program director, program coordinator, Workforce Career Coach, and qualified CTE faculty for program/pathway development; contractual services for new program development, evaluation, marketing, and research consultants; costs associated with hosting regional planning events; professional development; and employee travel for collaborative efforts within the region and VCCS.
When \$500 million career pathways' grants ran dry, so did regional collaboration	Fensterwald	December 2018	The California Career Pathways trust gave school districts, community colleges, and businesses \$500 million to create hundreds of new programs in dozens of sectors from health to technology, and 5	The consortia created important pathways during the grant period, but many of these collaborations disbanded or did not sustain staffing. This caused members to turn their attention to other matters as new grants or initiatives surfaced. The regional collaborations proved

			years later, many of the career and college pathways that the money inspired continue; however, the spirit of regional collaboration behind them has largely faded. Most of the consortiums failed to achieve the hoped-for regional impact and fully sustain the alliances	"overly ambitious." As the 3-year funding ended, some consortia cut back the number of pathways, others laid off the staff responsible for building relationships, and aligning the pathway courses became complicated. Further, relationships between high schools and some community colleges were difficult. However, there are 2 success stories: Orange County Regional Consortium and Tulare-Kings College and Career Collaborative. Both built lasting relationships and involved partners in making decisions.
Professionalism, Sense of Community and Reason to Learn: Lessons from an Exemplary Career and Technical Education Center	Genter, Rizza, Peters, & Hu	2005	With the current focus on academic proficiency, CTE programs have received less emphasis as an alternative to traditional high school curricular experiences. Yet, the authors found that—when compared to peers in general high school settings—students in 1 rural CTE high school center perceived significantly more appeal, challenge, choices, meaningfulness, and self-efficacy in their classrooms. An extensive qualitative study provides insights into this environment that distinguished it from traditional secondary school settings. Themes of professionalism, sense of community, and reason to learn emerged in data analyses. Results offer methods that secondary educators can use to engage students in meaningful, challenging learning. Further, experiences of students in this center’s CTE programs are shared. The authors concluded that efforts to leave no children behind should include CTE as part of the continuum of educational services.	Professionalism at the CTE center was pervasive, existing in all aspects of the students' experiences and interactions, from the manner in which students were treated to the instructors' backgrounds. The researchers identified 8 key findings that distinguished the CTE center from traditional high school settings: 1) Students experienced content from a relevant (to them) career and real-world perspective; 2) Students received professional treatment and respect from adults at the center, where learning was focused but informal; 3) Resources, speakers, and experiences outside of the classroom were common and viewed by all participants as integral to the programs of study; 4) Academics were balanced with hands-on learning, which had great appeal to students; 5) Instructors and adults knew their students, showed genuine interest in them as people, and worked to solve problems; 6) The staff and students at the center had access to and used high tech equipment; 7) Faculty seemed unusually qualified and skilled. They had professional and educational expertise; and 8) Students spent large blocks of time in their programs—at least 2.5 hours per day for 2 years. Programs consisted of classroom, lab, and field experiences.
State Strategies to Scale Quality Work-Based Learning	Hauge & Parton	October 2016	Industries in every state are struggling to find qualified applicants for jobs, while job seekers too often find they lack the skills needed to enter or move along a career pathway to a good job. Preparing a workforce that is poised to meet the needs of businesses and ultimately to make the state more economically competitive is a top priority for many	There is a growing mismatch between the needs of industry and the skills of American workers. One promising strategy to address the skills mismatch is to expand high-quality work-based learning opportunities. These programs are hosted by employers in partnerships with educational institutions that connect authentic work experiences with structured learning activities. The authors present 4 components of a framework for high-quality, demand-driven work-based

			governors. Therefore, many of them are exploring ways to scale—increase opportunities for—high-quality, demand-driven work-based learning, as a proven way to prepare their citizens for the modern workforce.	learning: 1) clear work-based learning partnerships agreement, 2) Authentic work experience component, 3) structured learning component, and 4) culminating assessment and recognition of skills. Different states have identified several types of programs that are considered work-based learning, including internships, paid work experience, cooperative work experience, and apprenticeships. The authors suggest that governors are in the unique leadership position to help work-based programs in their states by first elevating the state vision and implementing state-led pilots. Then they should build infrastructure, provide incentives for industry, and provide incentives for education institutions. Finally, to sustain the program, states must collect data to track progress and identify strategic opportunities.
Best Practices in CTE Programs Planning and Evaluation	Hanover Research	2018	CTE programming supports students with diverse academic and vocational goals by preparing them for both college and career. CTE programming serves students across the country, with an estimated 94% of all high school students participating in CTE. CTE offers a practical way for students to apply their knowledge, sharpening their employability skills and reducing the likelihood of students dropping out of school. To ensure that CTE programs are meeting these needs, districts should enact a robust evaluation system to routinely assess the implementation and outcomes of the programs. This research brief discusses best practices in CTE programming, covering the factors that districts should consider when planning a CTE program, such as labor market demands, the program model, the curriculum, staffing requirements, and industry partnerships.	Hanover Research suggests 5 steps for CTE Program Planning. First, select a program model from the following four options: a) career academies, b) traditional high schools, c) dual credit models, and e) industry partnerships. Career academies are small learning communities of 300–400 students and work like a school-within-school program in high schools that offer curricula based on a specific career path or theme (e.g., health care, finance, information technology, business). Dual credit models typically exist within traditional high school settings; CTE courses fulfill both high school CTE graduation and industry certification requirements. Dual credit models include courses that are held during the school day, evenings, or weekends. Courses may be taught as a regular college course, adapted to a high school schedule with modified curricula, or offered in partnership with a post-secondary institution. Once a CTE program has been established, districts should conduct a labor market analysis to determine the subjects to offer; align CTE programming with broader college and career readiness needs; consider staffing needs including professional development; and establish industry partnerships between schools and businesses. To evaluate their program, districts should use data related to program implementation as well as academic and career outcomes.
2018 ACTE Quality CTE Program of Study Framework	Imperatore & Hyslop	October 2018	The 2018 ACTE framework is designed to apply individual, local CTE programs of study spanning secondary and post-	This 12-element framework includes: 1) standards-aligned and integrated curriculum; 2) sequencing and articulation; 3) student assessment; 4) prepared and

			secondary education. This tool can be used for program self-evaluation and program improvement to encourage secondary/post-secondary collaboration. The framework's 12 elements and 92 criteria are designed to be as mutually exclusive as possible.	effective program staff; 5) engaging instruction; 6) access and equity; 7) facilities, equipment, technology, and materials; 8) business and community partnerships; 9) student career development; 10) career and technical student organizations; 11) work-based learning; 12) data and program improvement.
Postsecondary Occupational Education Among Students Who Took Career and Technical Education in High School	Institute of Education Sciences, National Center for Education Statistics, Department of Education	April 2020	This report examines post-secondary education enrollment rates overall in occupational areas of study among a group of 2013 graduates 3 years post-graduation. The report uses data from the High School Longitudinal Study of 2009, which initially surveyed a nationally representative sample of Grade 9 students in 2009, with follow-up surveys in 2012, 2013, and 2016 and a high school transcript collection in 2013. The analysis is based on approximately 11,600 ninth graders who graduated from public high schools in 2013, had complete transcripts, and participated in the 2016 follow-up.	This report focuses on high school graduates who had been CTE concentrators in high school. CTE concentrators are defined as individuals who earned at least 2 credits in 1 of the 10 CTE subject areas (agriculture and natural resources; business, finance, marketing; communications and communication technologies; computer and information science; construction; consumer services; engineering, design and production; health care; mechanical repair and operation; and public services) or at least 3 credits in 1 of the CTE subject areas. Among 2013 public high school graduates, 38% were 2-credit concentrators and 20% were 3-credit concentrators. Major findings suggest about 75% of graduates who were CTE concentrators in high school enrolled in post-secondary education, although a lower percentage did so than among students who had not concentrated in CTE. After enrolling in post-secondary education, about 75% of CTE concentrators pursued an occupational field of study, but only about 25% were in a field aligned with their area of CTE concentration in high school.
Career and Technical Education Issue Brief: Current Trends and Results	Kamin	May 2018	Both the means and ends of American public education have long been debated by scholars, politicians, practitioners, and the public. Most stakeholders have come to agree that preparing students for both college and career is an obvious yet difficult goal. CTE is one educational pathway that connects both paths. CTE programs offer pre-service career training and opportunities to develop the skills necessary for success in college. Is CTE meeting its goal to prepare students for career and college? A brief review of the limited literature suggests current CTE offerings may be beneficial for both professional and post-secondary	CTE programs vary widely in states and districts; however, there are some national trends. First, programs are typically grouped into "career clusters" at the state or district level. The number and type of clusters varies, but the general purpose is the same: encourage students to focus on a particular set of courses that align with a particular career path. Second, is the development of "pathways." Pathways are designed to support students' progression through their secondary academic careers with specific benchmarks. This brief suggests 3 policy recommendations when considering CTE coursework: 1) Expand and encourage "concentration" with in-depth CTE coursework; 2) Develop and adopt clusters and/or pathways that support student learning and curricular choice; and 3) Encourage students to go beyond

			outcomes. Further, current research provides one particularly salient and policy-relevant conclusion: students who take in-depth coursework in a single CTE program of study see particularly strong academic and career-oriented results.	clusters and pathways traditionally associated with "students like them."
Career & Tech Education in Greater Kansas City: Preparing High School Students for the Next Step	Mid-America Regional Council	November 2017	This report was created in response to community demand for information about CTE and ways to develop workplace competencies beginning in Grades K-12. It presents a snapshot of regional CTE in the Kansas City metropolitan area.	Best practices found in Kansas City: professional learning, employability skills, and industry engagement, individual student dashboards, teaching fellows, teacher development, curriculum alignment, using existing state waivers, strong partnerships, earn-while-you learn model, scalability, tracking indicators, and education partnerships.
Career Opportunities: Career Technical Education and the College Completion Agenda. Part II: Inventory and Analysis of CTE Programs in the California Community Colleges	Moore, Jez, Chisholm, & Shulock	February 2012	This report examines the full set of career-oriented credentials offered by the California Community College system. It includes an inventory of CTE programs across the system and analysis of program information as a basis for understanding how the breadth and complexity of CTE programming within and across colleges contributes to the overall performance of CTE. The authors address how well the CTE programs offered across the system are meeting students' needs to identify, enroll in, and complete programs with real value in the labor market.	Key issues regarding inventory of CTE Programs: Extensive program offerings appear inefficient. The large and diverse set of courses does not appear to reflect careful planning around which programs best meet the needs of the economy and the interests of students in credentials with real value. There are many programs with few students and many programs with very few completions, which implies that the programs exist because program review processes are ineffective at keeping program offerings virtual, reflect faculty availability rather than student interests/industry needs, or both. Next, there is an abundance of short-term certificates and this limits individuals' workplace value. Short-term certificates should serve as building blocks. Further, there is considerable and problematic inconsistency across similar programs—in name, credit length, course requirements, and expectations for basic skills competency; this prevents good understanding among students and employers about the meaning of particular credentials.
Secondary to Postsecondary Articulation for Career Technical Education: Frameworks for Effective Practice	North & East Bay Pathways Consortium	2015	Publication provides recommendations and effective practices on supporting collaboration between secondary and postsecondary faculty to develop seamless transitions in CTE programs within a pathway, program of study and/or sequence of courses supported by articulation agreements.	Offer best practices for developing effective credit by examination protocols for awarding college credit and for the development of articulation agreements.
Perkins V revision Guidebook	Office of Career, Technical, and Adult	no date	Since 2012, the Nebraska Department of Education's reVISION process has been instrumental in improving and	This report identifies 3 primary steps of the reVISION process: Each local community college will complete a Local CTE Assessment; they will bring the results of this

	Education/Nebraska Department of Education		strengthening CTE in Nebraska. This process provides Nebraska schools with the opportunity to analyze and transform their current CTE systems in order to improve their ability to educate a qualified workforce that meets industry needs within an ever-changing economy. Every district in the state now has the opportunity to complete this process or update what they have already done with the passage of Perkins V.	assessment to a regional meeting facilitated by the Nebraska Department of Education, where the Regional CTE Assessment will be completed; using the Local CTE Assessments and regional CTE Assessment Summary, eligible Perkins applicants will complete their Local Perkins Application, which details the 4-year plan for their CTE system.
The Necessary Components of an Effective Career and Technical Education (CTE) Program	Passarella	February 2018	The 21st-century economy necessitates and rewards both higher education credentials and skills development. As such, there is a growing interest among policymakers in creating and expanding effective CTE programs. However, there are few research-based resources in the field to guide policy. CTE is definitionally amorphous, with multiple possible characteristics and areas of focus. Furthermore, there is some disagreement as to whether the economy can sustain jobs that pay a median wage for skill levels that lie between strong high-school/entry level career and technical training and graduate-degree preparation. This report acknowledges the increased interest and the limited clarity about what works and provides policymakers with the available evidence on how best to develop effective CTE programs.	CTE programs should contain the following four anchors: 1) student cohorts in career-themed course sequences; 2) rigorous, college-preparatory academics; 3) opportunities to earn college credits and industry-recognized credentials or certificates; and 3) work-based learning opportunities, such as internships. Passarella identified 6 programs that exhibit key components of high-quality CTE programming. First, career academies, which operate as a "school-within-a-school" structure. Each academy has a career theme. Second, specialized regional and technical high-school-based CTE, in which students alternate between full-time academic courses and full-time work in their technical areas with all students engaged in some sort of CTE. Third, programs of study which are an aligned sequence of CTE courses that span secondary and post-secondary education. Upon completion, a program of study should result in the acquisition of an industry-recognized credential or certificate. Fourth, NAF Academies is a national network of education, business, and community leaders working to bridge the growing skills gap between young adults and higher skilled (and higher wage) employment. NAF aims to do this through its academies: small learning communities within traditional high schools. Fifth, <i>linked learning</i> integrates college-preparatory academics, rigorous technical training, work-based learning, and supports to help students stay on track. Linked learning designs pathways around industry-sector themes (e.g., engineering, healthcare, etc.). Sixth, the International Baccalaureate Career-related Program offers a promising example of an academically rigorous CTE curriculum.

<p>Developing High Quality CTE Programs through Business Engagement</p>	<p>Public Schools of North Carolina</p>	<p>no date</p>	<p>The purpose of this handbook is to help school systems and business partners improve the overall quality of CTE. This handbook, based on research and collaboration, outlines a process that business partnerships may follow to establish or improve the organizational structure of the partnership in order to plan and carry out a program of work based on the needs of the program and the community it serves.</p>	<p>Top 10 Characteristics of an effective partnership: 1) Engage partners, 2) provide feedback or results of the partners of work, 3) Develop an action plan, 4) provide a clear sense of direction, 5) provide expectations of the group, 6) develop attainable goals, 7) partner with a diverse group that represents all stakeholders, 8) deliver on action items, 9) communicate effectively, 10) define clear action steps.</p>
<p>Career Technical Education (CTE) Foundation Launches Fresh Initiative Support Local Workforce Pipeline</p>	<p>Simmons</p>	<p>March 2019</p>	<p>The CTE Foundation Sonoma County has launched its newest initiative in partnership with the county's largest employers and education institutions. The Sonoma Corps is a pilot program recruiting high school students in their senior year to prepare them for a "gap year" work experience internship following graduation.</p>	<p>In fall 2019, up to 20 seniors selected through a competitive application process, will attend semi-weekly classes to develop work-readiness and technical skills, meet employers, and explore how personal interests can lead to lucrative careers with Sonoma County employers. After HS graduation, seniors will begin a year-long paid internship based on their learning objectives and aligned to economic development needs in the county. After completing gap-year internships, participants will be awarded scholarships for tuition at a post-secondary institution.</p>
<p>Credentials for All: An Imperative for SREB States</p>	<p>Southern Regional Education Board</p>	<p>April 2015</p>	<p>The bridge from high school to post-secondary attainment and career opportunities is broken. To solve this problem, more high school students must get into community and technical college—and on pathways to post-secondary attainment and career advancement—much sooner</p>	<p>The solution is to transform education with rigorous, relevant career pathways that align secondary, post-secondary and workplace learning and lead to post-secondary credentials that help individuals secure good jobs. Double the percentage of young adults who earn post-secondary credentials by age 25 over the next decade. These include advanced industry credentials and post-secondary certificates and degrees at the associate degree level or higher. The report outlines 8 actions to achieve this goal: 1) Build bridges from high school to post-secondary education and the workplace by creating rigorous, relevant career pathways driven by labor market demand; 2) Expect all students to graduate academically ready for both college and careers; 3) Select assessments for technical workplace readiness standards that offer long-term value to individual students, employers, and the economy; carry college credits; and are directly linked to more advanced certifications and further study; 4) Provide all high school career pathway teachers, especially new teachers from industry, with professional development and fast-track induction programs they need to meet high academic,</p>

				<p>technical, and pedagogical standards and enhance students' academic and technical readiness for college and careers; 5) Adopt a framework of strategies to restructure low-performing high schools around rigorous, relevant career pathways that accelerate learning and prepare students for post-secondary credentials and degrees; 6) Offer early advanced credential programs in shared-time technology centers, aligning curricula, instruction, and technology with home high schools and community and technical colleges; 7) Incentivize community and technical colleges and school districts to double the percentage of students who earn certificates, credentials and degrees by setting statewide readiness standards and aligning assessment and placement measures with those standards; use the senior year of high school to reduce the number of students who need remediation, retool developmental education, adopt individualized support strategies for struggling students, and improve affordability for dual enrollment courses; 8) Design accountability systems that recognize and reward districts, high schools, technology centers and community and technical colleges that double the number of young adults who acquire post-secondary credentials and secure high-skill, high-wage jobs by age 25.</p>
The Future of Apprenticeships	St. Amour	June 2020	<p>Virtual apprenticeships could be a boom to the future, some experts say. They could open up opportunities for those with disabilities that make working in an office difficult, or provide greater access to those in geographic areas with a dearth of apprenticeship options. But virtual options could lack the important pieces of apprenticeships that make them successful, others say.</p>	<p>Nationally, registered apprenticeships require two components: classroom learning and on-the-job training with a mentor. When the COVID-19 pandemic began closing parts of the US, both components had to quickly transition to online formats. The article provides an example of Apprentice, a tech apprenticeship program. During the pandemic, the program pivoted to online education for learning requirements and it is working with companies to help apprentices continue their on-the-job training. Another example is Catalyze, a company that offers information technology apprenticeship. Catalyze also transitioned to an online format, including its mentorship piece. Transfer VR is creating opportunities for virtual-reality-based apprenticeship in manufacturing. Interplay Learning provides online training for jobs in the skilled trades. Right now, there is no clear guidance whether the Labor Department will allow mostly virtual or 100% virtual apprenticeships. Positives of virtual training include</p>

				decrease in injury and that mistakes will not negatively impact others. However, companies might not want to pay apprentices the wages they typically receive because of the virtual component. Virtual apprenticeship has the ability to broaden access but must be done right and held to the same standards as traditional apprenticeship models.
Delivering STEM Education Through Career and Technical Education Schools and Programs	Stone	May 2011	This paper identifies which CTE delivery systems (e.g., schools), programs, and curricular and pedagogic strategies promote and enhance the learning of STEM subjects. The author examines the extant research on STEM-focused CTE, with special attention given to the needs of diverse learners.	STEM-related CTE programs include regional shared-time centers, CTE high schools, and CTE offered within traditional comprehensive high schools. Within these structures, STEM-related CTE may also be delivered through programmatic structures such as career academies, programs of study, linked learning, or other variations. Three types of school structures are described: 1) regional career tech centers, 2) CTE High Schools, and 3) STEM-related CTE offered within traditional comprehensive high school. CTE programmatic models include career academies and tech prep and programs of study. One curricular and pedagogic approach to infuse STEM in CTE is described: Project Lead the Way, contextualizing math and science in CTE. Finally, two pedagogical approaches are discussed: project-based learning and work-based learning.
Regional Career-Technical Education Models	Superintendents Educational Services Association	January 2015	This report was prepared to inform the California County Superintendents Educational Services Association as the Association prepared to make recommendations to state policymakers regarding regional CTE models. The report is presented in two sections: literature review and state models.	There are 6 major findings from this report: 1) Large states employ multiple strategies to deliver career-technical education. Strategies include: career academies, early college high schools, dual enrollment programs, and efforts to support CTE in traditional high schools. 2) Most states profiled offer CTE career clusters aligned with the National Career Clusters framework. 3) Many state legislatures have prioritized CTE by enacting laws designed to increase access to CTE or improve graduation rates for students who pursue CTE pathways. 4) Effective CTE models share several characteristics: strategies that blend academics and CTE, innovative delivery models that allow students to develop meaningful relationships with mentors, and partnerships with postsecondary institutions. 5) Align secondary CTE with postsecondary programs. Two common methods include Early College High Schools and dual enrollment programs. 6) Metrics most often used to gauge the performance of CTE in states include: academic attainment in reading/language arts, academic

				attainment in math, technical skill attainment, school completion, student graduation rates, placement, nontraditional participation, and nontraditional completion.
CTE Administrative Planning Guide: A Resource for Counselors, Administrators, and Educators	Virginia Department of Education	n.d.	The CTE <i>Administrative Planning Guide</i> (APG) includes information to help local school divisions plan and schedule instructional programs. The APG is organized by career clusters, with a complete listing of courses, concentration sequences, and credentials available to students as they plan for career entry and continuing education. Users may access course information by cluster or by searching for specific courses or certifications.	This website provides information pertaining to Career Clusters, Career Pathways, available course offerings, and course completion information.
CTE Local Advisory Committees: The Key to Strong, Successful Business/Industry Partnerships	Virginia Department of Education/Office of Career and Technical Education Services	August 2013	In this brief, the authors discuss how an advisory committee can help strengthen local or regional CTE programs.	A crucial component of successful CTE program is developing a partnership with an advisory committee. Advisory committees can encourage employers to become involved in student education and career preparation and help schools define and incorporate program and activities that meet employer needs. Advisory committee members can solicit recommendations for new programs, provide evaluation, and suggest improvements for existing programs. Members can support the CTE credentialing initiative and help educators bridge the cultural gap between education and business. From a local perspective, advisory committee members can serve as guest speakers; mentor students; advise administrators; participate in leadership activities; and sponsor events, field trips, and assemblies. From a state perspective, advisory committees can do similar things to get involved, but at a broader level. For example, they can solicit statewide partners in large industries, business and civic organizations, non-profits, professional organizations, and local and state government.
Perkins V Implementation: Aligning Career Pathways to your Region's Labor Market	West Ed	2019	To be most effective, K-12 and higher education programs must be aligned to regional workforce needs so that education and employment opportunities can be tightly connected.	Start the conversation with data: Limitations in labor market, need multiple and complimentary data sets, employers need to validate the data, and data aligns with state and regional goals to balance consistency with local context. This alignment will link labor market data with CTE pathways to inform Perkins V planning and needs assessments.

Multiple Pathways to Student Success: Envisioning the New California High School	WestEd for the California Department of Education	2010	This report makes recommendations to integrate the multiple pathways approach, a transformational strategy that integrates academic and career technical education, in California high schools.	Regional coalition efforts were discussed, including broad regional partnerships (e.g., Bay Area Council); regional efforts focused on workforce development (e.g., regional occupational centers); CTE community collaboratives; and cross-segmental regional coalitions to promote postsecondary transition, including the development of local or county P-16 councils.
Pathways Wisconsin: Regional Career Pathways	Wisconsin Department of Education	February 2018	The Wisconsin Regional Career Pathways approach is a statewide effort to deliver high-quality career pathways in high schools that reflect the needs and vision of a regional collaborative group of employers, education, and economic and workforce development.	The regional collaboratives adopt, implement, promote, and monitor high school career pathways in high-skill, in-demand industry sectors. They act as an advisory group, on behalf of regional districts, to identify and overcome barriers that prevent students in the region from accessing the pathway. An example of such a barrier might include college curriculum that is not aligned with the career pathway. In addition, the collaborative provides the means necessary for students to participate and complete a pathway by: a) taking a sequence of aligned courses, b) earning an industry-recognized credential, c) enrolling in dual college credit class, d) participating in career-based and work-based learning experiences, and e) accessing related CTE student organizations.
Advancing Manufacturing, Mechatronics, and Quality Consortium (AMMQC) Final Evaluation Report	Negoita, Goger, DeFever, Van Docto, Folsom, Levin, & Nowaczyk	2017	The purpose of the AMMQC initiative, launched in late 2013, was to enhance job training programs in advanced manufacturing by shifting toward a career pathways approach to training and aligning training programs with employer demand. The AMMQC included 4 community colleges in 4 states: Mount Wachusett Community College in Massachusetts, Bossier Parish Community College in Louisiana, North Central State College in Ohio, and Southwest Tennessee Community College in Tennessee.	Major implications from the study: alignment of expected timelines for implementation with performance measurement—career pathways development is a complex endeavor that requires considerable time to complete, especially for the development and approval of new credit curricula. Sustained systems-level investments: due to the complexity of implementing and staffing career pathways initiatives, future investments in career pathways should consider more sustained investments. Only toward the end of the grant period did colleges see increased word of mouth and gather awareness in local communities of the programs available. Enhanced tracking of student support services: better tracking of service dosage and employment outcomes will be necessary in future research to more comprehensively understand the impact of student support services on the outcomes of non-traditional students.
Denver Public Schools CareerConnect	n/a	no date	DPS Career Connect Apprenticeship Program, offered in partnership with Career Wise Colorado, is an immersive 3-	Debt-free college credit is offered through a Concurrent Enrollment program. "Guaranteed Transfer" credits are transferable to any public 2- or 4-year college or university in the state of Colorado. Depending on the

Apprenticeship Program			year experience in which students work for a company while attending school.	training plan a student selects, students may also be able to transfer up to 2 years of college credit toward an applicable degree to 1 or more public 4-year colleges or universities in the state. The apprenticeship program takes 3 years (except healthcare which is 4). In most cases, the apprentice will graduate high school after the second year of their 3-year apprenticeship. The final year of the apprenticeship is completed in the year after graduation. The apprenticeship schedule is different than the traditional high school schedule; apprentices leave their school campus on certain days or in the afternoon to work for a company partner. The rest of the week, apprentices take high school or college courses (or both), depending on their graduation needs and college readiness.
Staunton-Augusta-Waynesboro Ten-Year Career and Technical Education Strategic Plan	Offices of Economic Development for the Cities of Staunton, Waynesboro, and Augusta County	June 2018	This plan was set in motion by area employers who frequently, consistently, and repeatedly reported to economic developers that they are unable to fill critical jobs with the available workforce. The employers linked their inability to staff vacancies to the CTE programs offered in the region. Although additional factors play into shortages of a skilled workforce, the economic developers of Staunton, Augusta, and Waynesboro determined there was merit in evaluating the strengths, weaknesses, and opportunities of CTE in the 3 jurisdictions and what could be done, over time, to improve programs for the benefit of students, graduates, employers, and the region's economy. The governing bodies of the 3 jurisdictions joined in support of the effort. Funding for the strategic plan was jointly pursued through the Department of Housing and Community Development and the localities were awarded a "Building Collaborative Communities" grant in the later part of 2017.	Major goals of the strategic plan include: 1) Unify the disconnected elements, 2) Promote the programs, 3) Leverage and engage employers, 4) Innovate, 5) Formalize equipment and facilities upgrade planning, and 6) Trumpet success.

A.4 Facility Assessment Reports

Botetourt Technical Center

Site visit conducted on March 12, 2020.

Context

Botetourt Technical Education Center (BTEC) is located in Botetourt County, Virginia. Botetourt County is in the southwestern portion of the Commonwealth in the Roanoke Valley. Botetourt County was founded in 1770. It was initially formed from Augusta County and it derived its name from Lord Botetourt, who was a Governor of Virginia. Botetourt Schools serve approximately 4,650 students.



Program Overview

BTEC serves the school division's two high schools—James River High School and Lord Botetourt High School. Staff reported that Craig County Public Schools, through an agreement, also sends students to BTEC. Craig County has an annual graduating class of about 50 students and is unable to provide a comparable level of Career and Technical Education (CTE) programming for their students.

BTEC's mission is to provide a safe, challenging, and supportive environment in which all students have the opportunity to acquire and practice the skills needed to be successful in their chosen career, through applied academics. BTEC has strong CTE programs that have evolved with the intention of eliminating the stigma traditionally associated with pursuing trade and vocational school pathways. BTEC is unique in that students in some programs may dually enroll at Dabney S. Lancaster Community College (DSLCC), and others may dually enroll at Virginia Western Community College (VWCC). BTEC offers numerous courses and programs that range from Cybersecurity to Veterinary Technology. A comprehensive list of programs and related dual enrollment programs or certifications is presented in the table below.

List of Programs and Dual Enrollment (DE) Programs/Certifications

Program	Dual Enrollment/Certifications
Aerospace Technology	FAA Remote Pilot Certification/DE with DSLCC
Auto Body	ASE Certification, I-Car Portal Level 1
Auto Service	ASE Certification, Virginia State Inspection testing, Automotive Analysis and Repair Career Studies Certification, DE with VWCC
Building Trades	ICC Certification available, OSHA 10 Credential, DE with VWCC

Computer Systems Technology	PC Pro Certification, Other certifications available based on performance in courses, Partner with Radford University
Cosmetology	State Board License
Criminal Justice	DE with DSLCC
Cybersecurity	Test out Security Pro Certification, Partner with Radford University
Engineering	Manufacturing Specialist, MT-1, VWRS, DE with VWCC
Information Systems Technology	Python and HTML certifications, MS Technology Associate
Mechatronics	Siemens Level One Certification, DE with VWCC
Nurse Aide	C.N.A. license (State Board testing), DE with DSLCC
Teachers for Tomorrow	ParaPro
Veterinary Technology	Veterinary Medical Applications
Welding	American Welding Society Certifications OSHA 10 Credential

Program Enrollment

Staff at BTEC reported that enrollment has increased to approximately 600 students. Craig County currently sends approximately 30-35 students. The staff is hopeful that this number will increase in the future.

At this time, BTEC has stopped most dual enrollment due to the additional costs borne by families. A concern was students going to community college to earn a certification (e.g., AWS Welder) did not receive college credit for the same certification earned in high school. The administration questions why students should pay for dual enrollment tuition but not receive the same certifications offered in the community college. To address this issue, BTEC will be adding back some dual enrollment classes, at no cost, to students through DSLCC.

Many of BTEC's programs, such as Aerospace Technology, are very popular, so capacity is a concern. BTEC's Aerospace Technology program is near capacity, and some of the programs are above capacity. On the other hand, there are programs that are below capacity, and BTEC leadership evaluates every year whether programs should stay and what programs might need to be revised. There are some programs that will stay regardless of capacity because they are integral to the local industry.

BTEC uses a priority system for course enrollment which is based on seniority. For example, seniors receive priority over juniors, who receive priority over sophomores. There are no waiting lists. BTEC has increased enrollment capacity if possible and necessary. For example, Computer Systems is the first course in the Cybersecurity Program. Initial capacity was 50 students, but enrollment has become competitive, so BTEC increased student capacity to 75. BTEC uses a rubric system to track grades, attendance, work ethic, and several other aspects of student behavior.

It is a challenge to get certain CTE instructors because they have greater earning potential within their industry. For example, Auto Body was forced to be canceled one semester because BTEC was unable to hire an instructor. Eventually, an instructor was

found, and the program resumed. Another example is Aerospace Technology. It is a Technology Education program and the teacher must be able to dually enroll the class, which requires the teacher to qualify as instructor with additional postsecondary credentials such as a Master's degree, additional coursework, and industry license or certification. A list of programs, course numbers, and student enrollment is presented in the table below.

Program, Course Number, and Student Enrollment

Program	Course Number	Student enrollment
Aerospace Technology	8487	17
Auto Body Technology I	8676	28
Auto Body Technology II	8677	3
Auto Body Technology III	8678	4
Automotive Technology I	8506	27
Automotive Technology II	8507	15
Automotive Technology III	8508	2
Building Trades I	8515	30
Building Trades II	8516	2
Building Trades III	8517	8
Computer Systems Technology I	8622	63
Computer Systems Technology II	8623	23
Computer Systems Technology III	???	16
Cosmetology I	8527	16
Cosmetology II	8528	14
Cosmetology III	8529	16
Criminal Justice I	8702	35
Criminal Justice II	8703	22
Engineering I	8450	18
Engineering II	8451	18
Information Systems Technology I	6670	24
Information Systems Technology II	6640	12
Information Systems Technology III	6641	9
Mechatronics I	8554	11
Mechatronics II	8555	5
Nurse Aide I	8360	30
Nurse Aide II	8362	18
Veterinary Technology	8084	46
Welding I	8672	40
Welding II	8673	20
Welding III	8674	11
TOTAL ENROLLMENT		603

CTE Advisory Council and Business/Industry Involvement

CTE programs are required to have advisors from external industries, workforce boards and committees. Advisory Council members encourage employers to get involved in students' education and career pathways. BTEC has advisors from both the DSLCC service area and the VWCC service area.

Student Support and Leadership Development

There is evidence that students are encouraged to join and participate in Career and Technical Education Student Organizations (CTSOs), including SkillsUSA.

Programs in Detail

BTEC has a rich portfolio of CTE programs and courses available to students. During the site visit, the SEG team visited several classroom facilities, including those for Aerospace Technology, Automotive, Building Trades, and Computer Systems Technology.

Aerospace Technology is a new program to BTEC where students learn the skills and techniques to fly. Aerospace Technology offers a hands-on introduction to flight, space, and supporting technologies. Students explore the aviation and space industries through the following topics: history of aviation, aerodynamics and aircraft components, aircraft design, maintenance and safety, flight conditions, airport and flight operations, airport infrastructure, and the concepts of rocketry and space flight. Students also explore small unmanned aircraft systems, regulations, operations, procedures, and how unmanned aircraft systems fit into the national airspace system. Courses include Aerospace Technology—Certification and/or Dual Enrollment Option. Students in the program may also qualify to earn the FAA Remote Pilot Certificate for employment preparation.

- **Observations:** Aerospace Technology is a new program area and supports investment in the Allegheny-Highlands Drone Zone to assist with research and development, recreational use, unmanned aerial vehicle racing competitions, and training for unmanned systems. The instructor is a Technology Education teacher with a pilot's license.

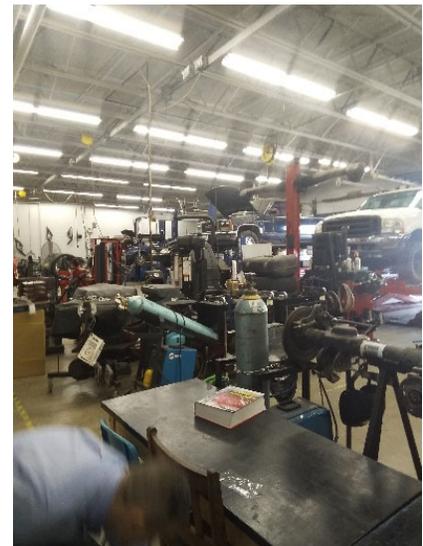


Auto Body prepares students for entry-level auto body careers and/or post-secondary automotive training with courses such as *Auto Body Technology I–III* and *Automotive Technology I–III*. Auto Body Technology at BTEC is certified through the National Automotive Technicians Education Foundation (NATEF) to Automotive Service Excellence (ASE) Standards and uses the Inter-Industry Conference on Auto Collision Repair, I-CAR curriculum. Certifications offered include: ASE—Painting & Refinishing and Non-

Structural Analysis & Damage Repair, S/P2 Safety—Collision Repair Safety, S/P2 Collision Repair and Refinish Pollution prevention, and EPA—In-House Painter Training Certificate.

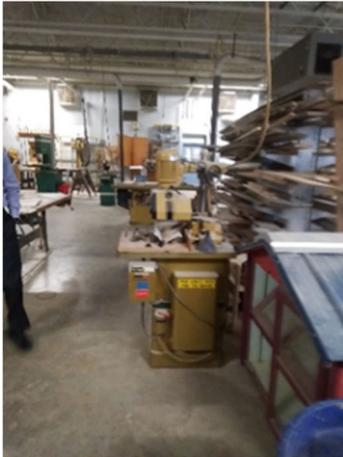
- **Observations:** The Auto Body shop was well organized, reasonably clean, and had the look and feel of a car collision repair shop. There were some items that should be stored; however, storage space for parts was lacking. When equipment or parts are not in use they should be stored away from workspaces on shelves, racks, or hangers.

Auto Service prepares students for entry-level automotive careers. Available certifications include S/P2—Safety Pollution and Prevention and ASE certifications (administered to AST-II students only). Students are tested in the following areas: Engine Repair, Steering and Suspension, Brakes, Electrical Systems, Electronic Systems, and Engine Performance and Maintenance and Light Repair. The Virginia State Inspection Class A license written and practical test is administered to AST-II students who are recommended by their instructors. All second year AST-II students participate in the classroom and shop portions of the Virginia State Inspection course. A Dual Enrollment option has been offered through VWCC’s Auto Service Technology program. The courses are as follows: Introduction to Automotive Systems (AUT.101); Auto Fuel and Ignition Systems (AUT.126); Automotive Electricity (AUT.241); Automotive Braking System (AUT.265); and Auto Alignment, Suspension, or Steering (AUT.266).



- **Observations:** The Auto Service shop had a lot of old engines, axles, and an assortment of parts. The students primarily work on older vehicles, but according to the staff a Ford dealer plans to donate a newer car. The shop appeared small, lacked storage space, and did not appear to be as organized as a repair shop business.

Building Trades is a 2-year program that prepares students for entry-level employment in the construction industry and/or continues training through post-secondary education programs at the apprentice, associates, or baccalaureate level. Program components include brick and block masonry, carpentry, electrical work, and plumbing. Students engage in planning, code information, and constructing projects that relate to the residential construction field.



Students have the opportunity to compete at district, state, and national levels in any trade or a combination of the trades through SkillsUSA. Students receive a 10-hour OSHA 10—Construction industry card and take International Code Council (ICC) certification testing. Certification and/or Dual Enrollment Option: ICC for Plumbing, Electricity, and General

Industry.

- **Observations:** Students in the building trades carpentry course complete projects for other courses. For example, the students were creating coat sleeves of a specific era that was being studied in English class. The shop needs more storage space and this lack of storage space contributed to safety concerns. For example, open and closed cans of stain and paint were left out. Masonry students learn to lay brick and block outside. There seemed to be ample space for the skills to be learned and work to be done.

Computer Systems Technology offers a sequence of two courses (*Computer Systems Technology I* and *II*) that prepare students to install, configure, and secure computer systems. The program is designed to provide students with practical experience assembling a computer system; installing, configuring, and securing various operating systems; troubleshooting computers and peripherals; and using system tools and diagnostic software. Students develop skills in computer networking and resource sharing and explore the relationships between internal and external computer components. Students are required to take the Testout PC Pro Certification in CST II. However, based on student performance and interest, many optional certifications are available through Microsoft, Cisco, CompTIA, Linux, Mac, Virginia STAR, and BTEC's partnership with Radford University.



- **Observations:** The lab had great equipment, was well organized, and had an industry look and feel. Students could use mock-ups of what they would find in industry where they would connect networks.

Cybersecurity is designed to teach many aspects of computer support and network administration. Students learn networking concepts, from usage to components, and

create peer-to-peer network systems and client server networks. Students learn how to install and configure network cards and connect them to networks; to install operating systems; to create, set up, and manage accounts; to load software; and to establish, implement, and maintain network integrity security plans. Software-based network operating systems addressed through the program include Windows Server and Linux. Students are required to take the Testout Security Pro Certification. Based on student performance and interest, other optional certifications are available through Microsoft, Cisco, CompTIA, Linux, Mac, Virginia STAR, and BTEC's partnership with Radford University.

- **Observations:** Same observation as Computer Systems Technology: The lab had great equipment, was well organized, and had an industry look and feel. Students could use mock-ups of what they would find in industry where they would connect networks.

Information Systems Technology (IST) teaches students the fundamentals of programming, multimedia, gaming, and web design. The IST program is a 3-semester program that prepares students to create dynamic websites using HTML/CSS and JavaScript; create and edit images using Photoshop CC; and the fundamentals of programming with Python, GameMaker Studio 2, and Unity. Courses are *Information Systems Technology I–III*, Certifications include Microsoft Technology Associate, HTML/CSS, JavaScript, and Python.

- **Observations:** The lab had acceptable equipment, was well organized, and had an industry look and feel. Students could use mock-ups of what they would find in industry where they would connect networks.

Mechatronics students learn about mechatronic systems in two courses, *Mechatronics I* and *II*. Mechatronic systems, comprised of mechanical, electrical, and software systems, form the foundation of robotics, automation, and advanced manufacturing (such as 3D printing). Students explore mechanical, electrical, and pneumatic/hydraulic systems related to mechatronics, as well as relevant computer technologies, and apply principles related to pneumatic, electro pneumatic, and hydraulic control circuits as well as basic digital logic and programmable logic controllers in a complex mechatronic system. This program offers both certification and dual enrollment options through VWCC. Possible certifications include Siemens Certified Mechatronic Systems Assistant Level 1, Manufacturing Specialist, and Manufacturing Technician Level 1.

- **Observations:** This lab had typical equipment to train on pneumatics, hydraulics, and a few learning stations to put together a process. The process is an input, processor, and output that required students to configure a manufacturing system and use their trainer knowledge. The lab could use more safety messaging.

Nurse Aide includes two courses that lead to a Certified Nursing Assistant certification following a State Board examination. Students learn how to check vital signs, charting,

first aid, and patient care procedures. They can also complete CPR certification. Clinical experience is a core part of the second-year curriculum. Students gain this experience by working 2–3 days a week at Carrington Place and The Glebe in Daleville. There is a dual enrollment opportunity through DSLCC for coursework.

- **Observations:** The Nurse Aide program typically has 40 first-year students and 20 second-year students. The reason for the decline in enrollment is unknown, however, after their first-year, students may choose a different career path for a variety of reasons. The lab was well organized and had information posted about employment.

Welding prepares students through a sequence of three courses to use manual arc welding and cutting processes to fabricate and join metal parts; perform welds in various positions, using multiple welding processes according to diagrams, blueprints, and specifications; and use arc welding and cutting processes in the manufacturing and fabrication fields. Students also learn safety-related practices and techniques and earn an OSHA 10 card. Students have the opportunity to earn AWS welding certifications. Welding has been offered with dual enrollment opportunities through DSLCC.



- **Observations:**
 - BTEC’s welding program is very advanced, and students must use computer aided drafting and design software to cut on the Computer Numeric Code plasma cutter. Multiple career pathways are possible through this program. For example, a student may take welding and learn the skills and also plan to become a welding engineer.
 - Staff noted a recent case in which a company was in dire need of welders, and they hired five BTEC students who were AWS certified. The students went to work after their morning classes. It was set up as a local elective and an unregistered apprenticeship.
 - The welding lab has an obvious industry presence. Industry partners donate equipment and provide materials. There were many large machines where students could learn additional metal fabrication skills. The lab was of reasonable size and the number of workstations was appropriate for enrollment. Safety messaging was available and the lab was reasonably organized. Altec, a local manufacturer and partner in the program, donates equipment and materials and hires graduates.

Other Program Offerings:

Criminal Justice is available to students who are interested in law enforcement; the court systems; and all areas of the corrections field, including jail, prison, probation, and parole. The first semester provides an overview of the criminal justice system (police,

courts, and corrections), and guest speakers are common. Students learn to identify, roll, and lift fingerprints, as well as basic defensive tactics and handcuffing techniques. The second semester includes field experience where students observe court. In addition, students engage in various activities at the Botetourt County Sheriff's Office and the local probation and parole office.

Engineering allows students to engage in hands-on STEM-based projects aimed at solving real-world problems. Students investigate engineering history, including major engineering achievements, and they examine the principal engineering specialty fields and their related careers. Students practice engineering fundamentals using mathematical and scientific concepts, and they apply the engineering design process through participation in hands-on engineering projects. Students participate in STEM-based, hands-on projects as they communicate project-related information through team-based presentations, proposals, and technical reports. The program offers both certification and/or dual enrollment options. Possible certifications include Workplace Readiness Skills, Manufacturing Specialist, and Manufacturing Technician Level 1. Some courses in the program qualify for dual enrollment credit through VWCC.

Veterinary Technology prepares students for postsecondary study in veterinary sciences. Course content integrates application of academics, development of career competencies, and instruction in course-specific knowledge and skills, such as the use of tools, equipment, and facilities related to veterinary medicine. Business management, leadership, and CTSO activities are included in the course.

Other Information

- Staff expressed concern that Perkins funding from VDOE may change the distribution formula and reduce precious equipment, training, CTSO, and other support to Virginia's CTE programs.
- Regulations were noted as a threat. For example, a 16-year-old who is certified as an AWS welder cannot work (full- or part-time) because industry regulations require them to be 18 years old. As noted under Welding, staff shared a recent case in which a company was in dire need of welders and managed to find a work-around for this regulation to hire five BTEC students. BTEC is willing to work with local businesses, including setting up work-based learning.
- Staff noted scheduling conflicts as a barrier. For example, a student is unable to take both calculus and aerospace because the course is offered at the same time. The schools have seen students take courses in lower academic levels in order to accommodate their schedule to include CTE courses. For example, a student might have signed up for AP English, but will drop it and take a non-AP English course to accommodate the CTE course.
- BTEC does not have a school counselor on staff, which they consider a missing piece. If there were a counselor, they would work more effectively with students on career choices. The staff recognizes that traditional school counselors might not have career counseling expertise. To help with this missing piece, BTEC

provides an annual presentation to orient their school counselors to local jobs and required skill sets.

Burton Center for Arts & Technology

Site visit conducted on March 9, 2020.

Context

The Burton Center for Arts and Technology (BCAT) is a specialty high school that offers courses designed to prepare students for a variety of professional and educational opportunities after graduating high school. It includes diverse programs that include traditional CTE, the Governor's STEM Academy, specialized programs for diverse talents and skills, and alternative education pathways. Located in Salem, Virginia, BCAT serves the Roanoke County public schools district. BCAT opened for instruction in 1962, with 75 students enrolled; today enrollment is greater than 900 students.



Program Overview

In its first year of operation BCAT offered programs in Auto Mechanics, Cosmetology, Drafting, and Electronics. The next school year, 1963-1964, five more classes were added, and ever since BCAT has continued to grow. BCAT offers numerous courses in four specialty areas: Engineering, Mass Communications, Performing Arts, and Visual Arts. Additionally, BCAT provides focused instruction for English Language Learners (ELL) who attend middle and high schools. The administrators at BCAT are committed to providing a comprehensive, focused resource that supports CTE and subsequent employment of its students. A comprehensive list of programs and sample of courses offered is presented in the table below.

Sample Program and Course Offering at BCAT

Program	Sample of Courses Offered
Center for Engineering	<ul style="list-style-type: none">• Algebra II• Engineering Analysis & Applications• Chemistry/Physics• Engineering Methods• AP Calculus• Engineering Internship

Center for Mass Communications	<ul style="list-style-type: none"> • Pre-AP English • Intro to Mass Communications • Media Production I • Applied Media Production & Internship
Center for Performing Arts	<ul style="list-style-type: none"> • Performing Arts I–IV
Center for Visual Arts	<ul style="list-style-type: none"> • Visual Arts I–IV • AP Studio Art
Trade, Industry, and Specialty Programs	<ul style="list-style-type: none"> • Automotive Service I–III • Cosmetology I–III • Early Childhood Education I & II • Game Design I & II • Mechatronics/Robotics I & II • Welding I–III

Program Enrollment

BCAT has collected enrollment data since its inception. By reviewing old yearbooks and newsletters, the school has traced enrollment numbers back to the early 1970s. At that time, there were approximately 290 students enrolled in the school. As of February 10, 2020, BCAT had 924 students enrolled (see *Current Enrollment at BCAT by Base School* table below).

BCAT’s recruiting strategy includes sending their school counselor to visit local elementary schools, sending program information to prospective students before they tour the facility, and inviting eighth-grade students to tour BCAT in the fall and attend an Open House. Information about the online application is shared with families in a variety of ways, including postcards, robocalls, and school announcements. BCAT staff members also visit local middle and high schools to follow up. The BCAT acceptance process involves reviewing applications and conducting a personal interview with prospective students. BCAT receives several hundred applications a year. The number of applications is far greater than the school can accommodate, with some programs receiving applications at two to three times program capacity.

Current Enrollment at BCAT by Base School

Base School	Base School Enrollment	No. of Students Attending BCAT
Cave Spring	986	212
Glenvar	644	110

Hidden Valley	879	230
Northside	900	198
William Byrd	1082	234

The *Current Enrollment by Program* table below summarizes the number of students enrolled by program. Trade, Industry, & Special Programs (429) has the largest number of students enrolled. Some programs have limitations and caps on program enrollment. Due to OSHA regulations, certain programs cannot exceed 20 students (e.g., Cosmetology, Masonry, Teaching Internship, and Welding). Game Design I and II, ISAEP, and Manufacturing Independent Study also have enrollment limitations due to space and/or seating constraints. Project Discovery and ELL classes include enrollment limits due to special education regulations, best practices, and ELL regulations. Every other program has an enrollment cap of 30. BCAT does its best to combine courses for maximum enrollment. For example, if Welding I has low enrollment numbers it might be combined with Welding II so that both courses are taught in one setting.

Current Enrollment by Program

Program	No. of Students Enrolled
Center for Engineering	105
Center for Mass Communications	88
Center for Performing Arts	36
Center for Visual Arts	74
Trade, Industry, & Special Programs	429
Extra Programs	44

Available Trade, Industry, and Special Programs enrollment data shared with SEG show that the IT courses (121) had the highest enrollment counts, followed by Arts, Audio/Video Technology, & Communications (114; see *Program Clusters and Course Enrollment* table below).

Program Clusters and Course Enrollment

Program Clusters	Enrollment
Architecture and Construction	74
Arts, Audio/Video Technology, & Communications	113
Career Connections	47
Human Services—Cosmetology	44
Education & Training	38
Health Science	73
Hospitality and Tourism	28
IT	121
Law, Public Safety, Corrections, and Security	53
Manufacturing	61
STEM	78
Transportation	61

BCAT has experienced a surge of applications during the last 2 years due to several factors, including a shift to online applications only, increased recruitment efforts, and an enhanced reputation for quality. Documentation shared with SEG demonstrated that the number of “first choice” applications exceeded the number of acceptances for every program except for Teaching Internship. State class size restrictions limit the number of students per course; therefore, some students are denied access to their “first choice” course. However, students might secure enrollment in a course that is their second or third choice. BCAT states it “wants the right students in the right programs for the right reasons and has a selection process that includes a review of student records, an interview, and a scoring system to select students.

CTE Advisory Council and Business/Industry Involvement

The members of the Advisory Committee with their affiliations are identified in the *2019-2020 General Advisory Committee Members for Roanoke County Public Schools (RCPS)* table below. Roanoke County has a General Advisory Committee (GAC) that meets three times per year to discuss workforce needs, Perkins funding, student apprenticeships, and relevant news and events that pertain to CTE and the committee. Each trade program at BCAT also has its own individual Advisory Committee. These committees consist of at least two business industry representatives, the teacher(s) in

charge of the program, and at least one parent. These advisors, as well as other business partners, were evident throughout all programs. They bring business and industry closer to the students and instructors. Of note is Wabtec, which encouraged BCAT to maintain a strong machining curriculum as part of the mechatronics program. Carilion supports the Introduction to Nursing program by providing equipment, work-based learning opportunities, and a formal partnership agreement that includes provision of a teacher. The local Associated General Contractors supports programs and makes recommendations such as reducing Oxy-Acetylene welding and increasing Tungsten Inert Gas (TIG) welding. Roanoke County Fire and Rescue supports the EMT program with donations and staff for lab-based practice and clinical ride-alongs. Advisors serve as CTSO supporters and judges, guest speakers, mentors, industry tour guides, career day speakers, and in other similar support roles.

2019-2020 General Advisory Committee Members for Roanoke County Public Schools (RCPS)

Name	Organization/Position
Steve Allen	RCPS: Teacher/Tech Ed
Mike Altizer	Western Virginia Water Authority
Cheryl Austin	RCPS: Special Education
Craig Balzer	Balzer and Associates, Inc.
Erin Barnett	RCPS: Science Supervisor
Randy Boone	RCPS: Teacher, Business
Cathy Brown	Blue Ridge Behavioral Healthcare
Yvonne Campbell	VWCC: Postsecondary Representative
Jim Cook	Appalachian Power
Dr. Rebecca Eastwood	RCPS: Assistant Superintendent
Melanie Fisher	RCPS: Assistant Principal at BCAT
Teresa Gibbons	RCPS: School Counselor
Terry Hartley	RCPS: Math Supervisor
Becky Hollins	Bride's House & Formals & Mr. Tuxedo
Martha Hooker	RCPS: Teacher, Marketing
Dan Hughes	Graham White Manufacturing Company
Dr. Shawn Hughes	RCPS: Associate Director of Counseling
Mark Jones	RCPS: CTE Supervisor
Christian Kish	RCPS: Principal of BCAT
Joe LeGault	RCPS: English Supervisor
Rob Leonard	F&S Building Innovations, Inc.
Chuck Lionberger	Parent and RCPS: Media Relations

Gillian Lionberger	Student
Jill Loope	Director of Roanoke County Office of Economic Development
Dana Martin	AI-Mart Training Consultants, LLC
Tim McGuire	Bill's Auto Sales
Jason Moretz	RCPS: School Board member
Dr. Ken Nicely	RCPS: Superintendent
Chris Overfelt	RCPS: Teacher, Trade & Industry
Chris Porter	VWCC: Dean of Learning Resources
Matt Razvillas	Trane: HVAC
Mike Riley	RCPS: Executive Director of Secondary Instruction
Morgan Romeo	Virginia's Blue Ridge Works
Tom Rowley	Roanoke County Office of Economic Development
Dr. Jackie Scruggs Taylor	JRS of VA, Inc.
Kenneth Shelton	Roanoke City Fire & Rescue
Steve Spangler	RCPS: Principal of CSHS
Jason Suhr	RCPS: CTE Director
Elizabeth Testerman	Appalachian Power: Sr. HR Representative
Tara Wiedeman	Carilion Clinic
Mike Wray	RCPS: School Board Member
Gordie Zeigler	SyCom Technologies

BCAT has several industry and business partnerships that strengthen program offerings. Below are selected partnerships relevant to this study:

- Students in Computer Information Technology Program use VA STAR funding to refurbish computers and laptops for the purpose of donating them to community organizations.
- The BCAT principal, along with the RCPS CTE director and supervisor, meet once a month with Roanoke County's Economic Development Manager to discuss CTE/BCAT programs and explore potential workforce partnerships.
- Jobs for Virginia Graduates works to support students in overcoming barriers to ensure high school graduation and successful employment. After an application process, 35 BCAT students participate in the program each year, developing life and employment skills that complement those trade skills they are working to master in BCAT's programs.

Student Support and Leadership Development

BCAT provides several opportunities for students to engage in CTSOs. These include Future Business Leaders of America (FBLA) and Family, Career, & Community Leaders of America (FCCLA). FBLA is intended for students enrolled in business programs and FCCLA is intended for students enrolled in the Culinary and Child Care programs. BCAT also offers SkillsUSA, which is an organization for students interested in health, industrial, trade, and technical occupations. Other supports for BCAT students include a school counselor who helps students with academic, career, and personal/social issues. There is also a Career Center that students can use before, during, and after school as they work on their academic and career plans.

Programs in Detail

Trade, Industry, and Special Programs

There are several programs and courses organized under the overarching program title of Trade, Industry, and Special Programs. These programs are varied and include curricula such as nursing, education, welding, auto mechanics, robotics, culinary arts, and computer information technology. Further information about these programs is included below.

Introduction to Nursing and Emergency Medical Technician are organized under the Trade, Industry, and Special program. These programs provide students with opportunities for field experiences; in the EMT program, students can earn dual enrollment as well as work toward a certification. Courses include Emergency Medical Technician I & II, Intro to Nursing Careers, and Nurse Aide.



- **Observations:** Students showed engagement, and the lab showed a lot of support from industry partners who donated equipment. For example, a working ambulance box (an ambulance without the front) donated by Roanoke County Fire and Rescue is used to provide students with a real-world setting for learning. The Introduction to Nursing program had a well-organized lab space with appropriate equipment. The lab was in two rooms with engaged students. There was clear job messaging.

Building Trades are also organized under the Trade, Industry, and Special programs category. In these programs, students can choose an area of specialty in home construction—electrical wiring, carpentry, or plumbing. They have the chance to work with contractors in Roanoke. Courses include Building Trades I & II.



- **Observations:** The program uses an innovative approach of building a structure on the school site; a new owner will move the finished building to their site. The instructor related a 90% hire rate. Site visitors reported insufficient space for instruction and materials storage.

Manufacturing encompasses two of the programs organized under the Trade, Industry, and Special programs category: **Mechatronics and Robotics** and **Welding**.

Mechatronic and Robotics allows students to engage in project driven activities. Also, Mechatronics offers dual enrollment opportunities. The **Welding** program focuses on skills that lead students to be highly employable. Courses include Mechatronics; Robotics I & II; Motorsports; Welding I, II, & III; and Manufacturing Independent Study.

- **Observations:**

- The Mechatronics and Robotics program is part of the Roanoke County Governor's STEM Academy and includes machine tool technology. It is a well-organized facility with mostly new machines, good spacing, and product throughput (input, process, output). Training was designed to flow through the stages of learning, and students were able to see the passage of learning required, although signage to indicate process flow was limited. Overall organization of the shop may be considered a "best practice." This is a good model for CTE training on how industry may be organized. There was ample evidence that employers were involved in the training process.
- The welding lab included the Motorsports program which is part of the Roanoke County Governor's STEM Academy. Students enter apprenticeships directly from this welding program.



Masonry is another program in the Trade, Industry, and Special programs category. These courses provide students the opportunity to work in various parts of the country and participate in apprenticeships. Courses include Masonry I, II, & III.

- **Observations:** In this shop, industry partners have donated much of the material requirements (e.g., brick/block). Students were organized in teams, with titles, to reflect the world of work. The student hire rate was low, but many students who begin the program successfully complete all three courses.



Other Programs:

Center for Engineering (a CTE program with integrated core classes)

The Center for Engineering is part of the Roanoke County Governor's STEM Academy and uses a design-based approach to engage students in collaborative and hands-on learning activities. As part of this program, students have internships in their senior year.

Center for Mass Communications (a CTE program with integrated core classes)

The Center for Mass Communications is part of the Roanoke County Governor's STEM Academy. The program includes hands-on learning opportunities and culminates in internships for seniors.

Franklin County Career Center

Site visit conducted on March 10, 2020.

Context

Franklin County Career Center (FCCC) is housed in a building across from Franklin County High School. Its Auto programs are in a small, separate building about a block away from the school. The center is also referred to as the John Smith Career Center, after a former CTE Director in Franklin County. Franklin County has a single high school.



Program Overview

FCCC provides CTE programs and dual enrollment opportunities for students who attend Franklin High School. Dual enrollment opportunities are offered through VWCC and/or Ferrum College. A comprehensive list of CTE programs is provided in the table below.

CTE Programs and Dual Enrollment/Certification Information

Program	Dual Enrollment/Certification
Agriculture	
Autobody	ASE Certification
Building Trades	VWRS, NCCER certifications
Business and Information Technology combined with Marketing	
Electrician	
Family and Consumer Sciences	
Health and Medical Sciences	
Masonry	
Technology Education	
Trade & Industrial	

Program Enrollment

According to VDOE, student enrollment at Franklin County High School in fall 2019 consisted of 2,057 students. Enrollment has remained fairly constant for the past 10 years.

Current CTE program cluster and course enrollment at the FCCC is presented in *Program Cluster and Enrollment Totals* table. Architecture & Construction is the largest program by enrollment (305), followed by Agriculture, Food, & Natural Resources (293).

In the Agriculture, Food, & Natural Resource Cluster, the Ag Mech/Basic Plant Sci 1 course has the largest enrollment with 113 students.

Program Cluster and Enrollment Totals

Cluster/Course	Enrollment
Agriculture, Food, & Natural Resources	293
Ag Fabrication/Welding I	29
Ag Mech/Basic Plant Sci 1	113
Ag Production Mgmt	19
Equine Management	14
Horticulture Operations	19
Small Animal Care	48
Veterinary Science	20
Wildlife/ Natural Res Mgmt	31
Architecture & Construction	305
Building Trds 1	89
Building Trds 2	26
Building Trds Dir/Study	9
Electricity 1	71
Electricity 2	9
Electricity 3	6
HVAC directed study	6
HVAC I	29
HVAC II	13
Masonry I	32
Masonry II	15
Arts, Audio/Video Technology & Communications	250
Animation/Digital Photo	46
Electronic Music/Recording	49
Electronics 1	43
Electronics 2	24
Intro to Media	17
Journalism 2	5
Journalism 3	1
Television Production Directed Study	3
Television Production I	40
Television Production II	22
Business Managements & Administration	163
Business Law	24
Entrepreneurship/Small Bus Mgmt	20
Keyboarding Technology	49
Microsoft Office	47

Office Skills I	18
Office Skills II	5
Education and Training	285
Early Childhood Ed 1	73
Early Childhood Ed 2	20
Family & Consumer Sciences	24
Intro Early Childhood	95
Intro to Leadership	49
Teachers for Tomorrow	24
Finance	24
Accounting	24
Health Sciences	189
Emerg Medical Tech	12
Health Assistant I	107
Health Assistant II	14
Medical Terminology	56
Hospitality and Tourism	98
Intro to Culinary Arts	98
Information Technology	80
Computer Syst Tech 1	35
Computer Syst Tech 2	6
Game Design/ Programming	39
Networking Essentials	0
Law, Public Safety, Corrections & Security	157
Criminal Justice 1	109
Criminal Justice 2	48
Manufacturing	24
General Maintenance I	14
Robotics Technology	10
Science, Technology Engineering & Mathematics	41
Engineer Draw/Design	0
Technical Drawing & Design	41
Transportation	120
Auto Serv Tech 1	62
Auto Serv Tech 2	8
Autobody Technology I	29
Autobody Technology II	21
Grand Total	2029

CTE Advisory Council and Business/Industry Involvement

CTE programs are required to have advisors from external industries boards and committees. Advisory Council members encourage employers to get involved in students' education and career. The Advisory Council works hard to acknowledge each program and make the community aware of the CTE programs at Franklin High School. They host and advertise an annual career fair in April. A list of Franklin County Advisory Council members is provided below.

2019-2020 Franklin County Advisory Council

- Robbie Dooley: Supervisor, Franklin County CTE
- Matthew Rutrough: Rutrough Plumbing & Electrical, LLC
- Lace Robinson
- Walter Hughes
- Dr. Mark Church: Superintendent, Franklin County Schools
- Cheyenne Anderson
- Delia Heck
- Barry Whitlow
- Van Flora
- Madeline Pedersen: Student Member, Franklin County School Board
- Kristen Bryant
- Jamya Mattox
- Myles Gilbert
- Mike Smith
- Barbara Humphreys
- Julie Nix: Chairperson, Franklin County School Board
- Ken Kilinski
- Brian Jones

There was evidence of employer involvement at all levels of the FCCC, including curriculum and apprenticeships. The level of business and industry involvement varies according to program. Businesses and industries in Franklin County are not familiar with a lot of CTE credentials, but they do recognize some credentials such as NCCER, OSHA 10, EPA 608, and ASE Advisors and partners advocate for CTE programs.

Student Support and Leadership Development

The FCCC has several CTSOs. These include FBLA, FCCLA, FFA, HOSA, SkillsUSA, and TSA. The students also participate in SkillsUSA signing day.

Programs in Detail

Auto-Body Technology consists of three courses. Auto-Body Technology I is an industry certification preparatory course designed to help students interested in collision repair and related fields to gain entry level employment skills. In Auto-Body Technology II students learn a higher degree of skill that includes replacement of structural and cosmetic panels (bolt-on and weld-on); glass removal and installation; installation and removal of interior trim; advanced welding; spray booth skills, such as painting enamels and urethanes; and how to apply stripes and pin stripes. Auto-Body Technology III is a yearlong ASE certification course and a continuation of all the skills developed in the first- and second-year courses. Students in Auto Body I, II, & III are expected to join and participate in SkillsUSA.

- **Observations:**

- The autobody and automotive technology program has a considerable commitment from the industry with respect to painting and a paint booth. It is an ASE program. Employers, especially PPG Paint and Nelson Collision, provide equipment and materials. The instructor has a good connection with the industry, including Snap-On and Maaco. Students compete in SkillsUSA. One notable partner, Lincoln Tech, has recruited from the class in the past.
- The shop itself is a cluttered working area and could benefit from a stronger approach to overall safety.

Automotive Service Technology consists of a three-course sequence. Automotive Service Technology I is a 1-credit course designed to introduce students to the skills necessary for working on automobiles. Automotive Service Technology II is a year-long ASE certification course and a continuation of the first course; students advance, based on individual progress, toward more demanding tasks in the area of automobile repair. Automotive Service Technology III is a double-block (2 credit) ASE certification course. In this course students experience higher level individual tasks including some computer diagnostic tasks and more opportunity for the student to diagnose, locate, and correct problems. Students enrolled in Automotive Service Technician I, II, and III are expected to join and participate in SkillsUSA.



Building Trades offers a 2-course sequence. In Building Trades I, students develop entry level skills in blueprint reading, hand tools, power tools, and basic carpentry. Building Trades II is a double-block (2 class periods) one semester course where

students develop advanced skills in applied safety and complex carpentry skills and techniques. Students select projects to learn higher level skills. Students in Building Trades I and II are expected to join and participate in SkillsUSA.

- **Observations:** The carpentry program is a general building trade and is in a shop with reasonable workspace.

Electricity is a 3-course sequence in electrical work. Electricity I is a 1-period, 1-semester course intended to familiarize students with basic residential wiring practices and electrical theory. In Electricity II students become more deeply involved in all phases of residential wiring and basic electrical theory. Electricity III is a 2-period, 1-semester course that allows students to further hone their skills in preparation for future employment.



- **Observations:** Courses are taught by a Franklin County Alumnus. The courses provide OSHA 10 certification training. Some supplies are donated by industry partners. High quality training and learning aids are provided (see picture above). Students compete in SkillsUSA.

Masonry offers a 2-course sequence. Masonry I provides a general introduction to masonry jobs, with students gaining familiarity with the correct use of tools used in bricklaying. In Masonry II students review tools and skills and then move, based on individual progress, to more advanced skills in the commercial and residential masonry trade. Students are expected to join and participate in SkillsUSA in both courses.

- **Observations:** The masonry program is housed in a small area and consequently somewhat cluttered. Students have worked on projects in the community such as patios, walls, and pavers. In the classroom, the small environment makes it very difficult to accomplish much. Many of the supplies come from school resources.

Other CTE courses:

Business and Information Technology combined with Marketing: Accounting, Advanced Accounting, Business Law, Computer Programming, Entrepreneurship, Game Design and Programming, Intro to Leadership, Keyboarding, Marketing, Microsoft Office, Sports Marketing, Teachers for Tomorrow (Intro, I, & II).

Family and Consumer Sciences (FACS): Early Childhood Education (Intro, I, & II); Intro to Culinary Arts; Intro to FACS; Nutrition and Wellness; and Step into Success

Health and Medical Sciences: EMT, Fundamentals of Medical Terminology, Health Assistant I & II, and Nurse Aid

Technology Education: Architectural Drawing and Design, Cybersecurity I & II, Computer Systems Technology, Digital Imaging/Communication Systems, Electronics I & II, Engineering Career Studies, Engineering Drawing and Design, Mechatronics, Networking Essentials.

Trade and Industrial: Criminal Justice I & II, HVAC I, II, & III

Other Information:

- Students actively work at a job site with the HVAC program. The school also receives 2–3 calls each week from people to have their vehicles repaired.
- The center is limited for space; programs are very well supported and the director is looking to expand offerings. Funding comes from the community in support of SkillsUSA. NCCER Core and OSHA 10 are available for all students.
- Job shadowing and some mentorships are available, but mainly after students are hired. Teacher externships have been available in the past in 1–2 construction trades where teachers work on employer job sites to maintain their knowledge of current practices, skills, and knowledge.

Jackson River Technical Center (JRTC)

Site visit conducted on March 11, 2020.

Context

Since 1970, the Alleghany County Board of Supervisors and School Board, the Clifton Forge City Council and School Board, the Covington City Council and School Board, and other groups and individuals came together to



support the creation of the Jackson River Technical Center (JRTC). JRTC is the only regional technical center in the WWVDB study. It serves approximately 350–365 students every year. The center supports the unified Alleghany County/Clifton Forge Public Schools and Covington City Public Schools. Currently there is an ongoing study being conducted to determine whether these two municipalities should merge to create one city. The area is economically depressed with higher unemployment than most counties in Virginia.

Program Overview

JRTC has no registered apprentice programs, although students have a high rate of passing credentialing requirements, which leads to a high level of job placement. The center is organized around nine programs and only CTE courses are offered at the center. The upper level courses are double blocked on a 4x4 schedule with 4 classes scheduled at a time. This allows students to earn up to 8 credits per year, with a total of 32 credits over 4 years of high school—exceeding both the standard and the advanced Virginia High School graduation requirements. Compared to a traditional 7-block schedule, the 8-semester structure provides students with twice the opportunity to complete required courses, it allows more daily time in CTE courses, and it allows JRTC teachers to interact with students every day. The principal would like to offer more programs for students and believes the school has the capacity. The principal further believes that given the economics of the areas, the schools would be best served if all CTE courses were under one “umbrella.”

Most students enter the workforce directly from JRTC programs. The largest employer is the West Rock Paper Mill in Covington. Due to the loss of businesses and the increase in West Rock production, there are many warehouse jobs connected to the mill. Another potential employer, SchaeferRolls, moved to the area and has prompted a need to bring back machinery courses. JRTC works with DSLCC and would like to offer Precision machining for high school students during the day and community college students at night as a partnership. Another potential employment growth area is the drone industry. A comprehensive list of programs is presented in the *List of Programs and Dual Enrollment/Certification* table below.

List of Programs and Dual Enrollment/Certification

Program	Dual Enrollment/Certifications
Automotive Technology	
Carpentry	
Computer Systems Technology	A+ Certification
Early Childhood Education	CPR/ First Aid Training
Electricity	
Marketing	
Nurse Aide/Health Assistant	Certified Nursing Assistant (CNA) Certification
Welding	OSHA 10-Hour Construction Industry Card Welding assessment through National Occupational Competency Testing Institute (NOCTI)

Program Enrollment

Since budget cuts in 2008, JRTC has struggled with the cost of Programs, but has seen improvements in recent years. Most employer engagement is at the program level. There is a perceived need to increase Agriculture programs, such as Forestry, which will support the West Rock Paper Mill. Allegheny and Covington maintain separate CTE programs. Currently, Construction (90) is the largest program by enrollment, followed by Transportation (53), and IT (53; see *Program Cluster and Enrollment Numbers* table below).

Program Cluster and Enrollment Numbers

Program Cluster	Enrollment
Construction	90
Education and Training	33
Health	27
Health Science	34
Hospitality and Tourism	65
IT	53
Manufacturing	51
Marketing	50
Transportation	53
Grand Total	424

The Nurse Aide I course (20) has the highest enrollment, followed by Carpentry III (18) and Sports & Entertainment Marketing (18; see *Course Name, Clusters, and Total Enrollment* table below).

Course Name, Clusters, and Total Enrollment

Course Name	Cluster	Total
Advanced Marketing	Marketing	10
Auto Tech I	Transportation, Distribution, and Logistics	32
Auto Tech II	Transportation, Distribution, and Logistics	12
Auto Tech III	Transportation, Distribution, and Logistics	9
Carpentry I	Architecture & Construction	20
Carpentry II	Architecture & Construction	13
Carpentry III	Architecture & Construction	18
Computer Systems Technology I	Information Technology	32
Computer Systems Technology II	Information Technology	4
Culinary Arts I	Hospitality & Tourism	13
Culinary Arts II	Hospitality & Tourism	13
Cybersecurity Fundamentals	Information Technology	15
Cybersecurity Systems Technology	Information Technology	2
Early Childhood Education I	Education & Training	12
Early Childhood Education II	Education & Training	3
Electricity I	Architecture & Construction	18
Electricity II	Architecture & Construction	10
Electricity III	Architecture & Construction	11
Entrepreneurship	Hospitality & Tourism	7
Intro Early Childhood	Education & Training	18
Intro to Culinary Arts	Hospitality and Tourism	16
Intro to Health & Medical Science	Health Science	27
Marketing	Marketing	16
Nurse Aide I	Health Science	20
Nurse Aide II	Health Science	14
Opportunities in Hospitality & Tourism	Hospitality and Tourism	16
Sports & Entertainment Marketing	Marketing	24
Welding I	Manufacturing	25
Welding II	Manufacturing	14
Welding III	Manufacturing	12

CTE Advisory Council and Business/Industry Involvement

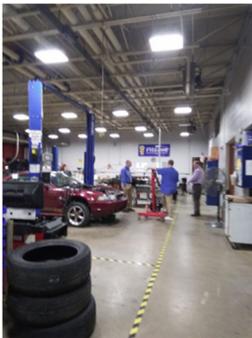
CTE programs are required to have advisors from external industries boards, and committees. JRTC has a CTE Advisory Council. Industry partners, such as local auto dealers, West Rock Paper Mill, and Low Moor Conversion; local builders; and other stakeholders meet to assist in program design and development. JRTC is also governed by a joint board with representation from Covington City and Alleghany County.

Student Support and Leadership Development

JRTC provides several opportunities for students to engage in CTSOs. These include DECA and Health Occupations Students of America (HOSA).

Programs in Detail

Automobile Technology is a 3-course sequence based on NATEF standards and students. Automotive Technology I is a 1-credit, 1-semester course designed for students interested in the automotive technology field. Studies in this course include basic safety, identification of automotive systems, proper use and safety with basic hand tools, minor repair and maintenance of an automobile, general interior and exterior maintenance of



an automobile and occupations in the automotive field. Automotive Technology II is a 2-credit, 1-semester, double block course designed to give students instruction in the basic principles in the class, such as safety, shop tools, service manuals, engine principles measurements, design and construction, mechanical and fluid engine systems, and electrical engine systems. Automotive Technology III is a 2-credit, 1-semester, double block course designed to expand knowledge learned in the previous two automotive technology



courses. In this course students receive instruction in emission control systems, automotive computers, power transmission systems, vehicle suspension and control systems, vehicle accessory systems, and the work experience program.

- **Observations:**

- The shop is well organized and supported, by a small degree, by one auto dealer. The larger dealers do not directly support the program but do hire students. Snap-on tools wants to establish a partnership that will enable students to purchase their tools at a 50% discount.
- The shop is clean. The instructor of the course is working on making the shop area more efficient and installing a new vacuum system for exhaust fumes. Investments are being made in equipment; for example, the instructor pointed out the new alignment machine during the site visit.

- Most customers come from the community—parents, locals, and so forth.
- Student lessons are more geared toward troubleshooting and problem identification than actual repair.

Building Trades offers a 3-course sequence of courses in Carpentry. Carpentry I is a 1-credit, 1-semester course designed to introduce students to the principles of carpentry as they relate to construction. Carpentry II is a 2-credit, 1-year course designed to give students more emphasis on carpentry principles; students are involved in construction of a house, cabinetmaking, and other carpentry work. Carpentry III is a 2-credit, 1-year course designed to give students advanced emphasis on carpentry. In this course students receive classroom and lab instruction in safety, installation of windows and doors, drywall construction, ceiling finishing, interior trim work, blueprint reading and drawing, and the construction of a house.



- **Observations:** The carpentry shop is generally well organized, with some safety information visible. Students work on a variety of projects, from building bed frames with a headboard and footboard to replicating parts as would be done in manufacturing.

Electricity offers a 3-course sequence. In Electricity I, a 1-credit, 1-semester course, students gain basic electrical knowledge and performance skills required to work in the building trades field. Electricity II is a 2-credit, 1-year course in which students continue to develop skills in the installation, operation, maintenance, and repair of residential, commercial, and industrial electrical systems. Electricity III is a 2-credit, 1-year course in which students continue to develop skills from the previous two courses.

- **Observations:** The electricity program is evolving toward a full-year program. Students tend to join the labor union International Brotherhood of Electrical Workers, or IBEW and get into electrician apprentice programs jobs. The shop is well equipped, with ample workstations and realistic work areas. The IBEW donated equipment.

Health Science includes an introductory course in health occupations, designed to introduce students to various occupations within the healthcare field, including a 2-

course sequence in Nurse Aide. Nurse Aide I is a 2-credit, 1-year course designed for students to develop basic nursing care and skills used across many health assisting careers. Students in this course can participate in HOSA. Nurse Aide II is a 2-credit, 1-year course designed to offer students advanced preparation through classroom instruction and clinical experience with an emphasis on developing advanced skills through clinical work experience managed by the teacher in a local nursing home. Satisfactory completion of the nurse aide theory and clinical components prepare students to take the written and skills tests to become a Certified Nursing Assistant (CNA).



- **Observations:** The Healthcare labs were clean, neat, and a reasonable resemblance to the real job setting.

Manufacturing: The manufacturing program is the **Welding Program**, which is offered as a 3-course sequence. Welding I is a 1-credit, 1-semester course designed to introduce students to welding and occupations in the welding field. With successful completion of this course, students receive an OSHA 10-hour construction industry card. Welding II is a 2-credit, 1-year course designed to advance SMAW welding and begin GMAW & FCAW & GTAW welding. In this course students explore colleges, apprenticeship programs and possible post-graduation paths. Welding III is a 2-credit, 1-year course



designed to provide students more extensive training in SMAW, GMAW, FCAW, & GTAW processes. In Welding III students review theory and take the welding written assessment test for the National Occupational Competency Testing Institute (NOCTI).



• **Observations:**

- The shop was recently granted \$250,000 for upgrades and new equipment. The shop is well designed and its design offers an excellent model for other programs.
- The instructor makes hiring recommendations to an employer and that is typically all the employer needs. Then, employers help the JRTC graduate with certifications.

Other Programs:

Family and Consumer Sciences (FACS): Culinary Arts Intro, I, & II, Early Childhood Education Intro, I & II

Marketing: Marketing, Advanced Marketing, Sports and Entertainment Marketing, Sports and Entertainment Management, Opportunities in Hospitality and Tourism, and Entrepreneurship Education.

Trade and Industrial: Cybersecurity Fundamentals, Cybersecurity Systems Technology, Computer Systems Technology I & II

Roanoke Technical Center

Site visit conducted on March 13, 2020.

Context

Roanoke Technical Education Center (RoTEC) serves high school students in Roanoke City, Virginia. RoTEC offers a variety of specialized courses and programs in CTE. These courses are designed to prepare students with the knowledge, skills, and attributes desired by local employers. Students are encouraged to explore CTE programs in Grades 9 and 10 and then select a major program of study in Grades 11 and 12. Most of the courses offered at RoTEC include dual enrollment credit opportunities through VWCC.



Program Overview

RoTEC administration is committed to providing a comprehensive, focused resource that supports CTE and the subsequent employment of its students. The programs range from Business Information Technology to Welding. Students may dually enroll in VWCC in Culinary Arts, Welding, and Automotive Technology to receive both high school and (in some cases) transferable college credit. In addition, industry credentials often mirror those offered at the community college system, which enables students to meet industry standards and readiness for employment in a cost-effective manner. A comprehensive list of programs is presented in the *List of Programs and Course Snapshots* table below.

List of Programs and Course Snapshots

Program	Snapshot of Courses Offered
Architecture and Construction	<ul style="list-style-type: none">• Carpentry I-III
Automotive Technology	<ul style="list-style-type: none">• Auto Tech I-III
Business Information Technology	<ul style="list-style-type: none">• Business Cooperative Education<ul style="list-style-type: none">◦ Computer Information System• Cybersecurity Fundamentals• Programming• Programming-Advanced
Health and Medical Sciences	<ul style="list-style-type: none">• Health Assisting Careers• Intro to Health Science• Medical Terminology• Nurse Aide I-II
Pre-Engineering	<ul style="list-style-type: none">• Engineering I-III• Precision Machining I
Welding	<ul style="list-style-type: none">• Welding I-III

Program Enrollment

RoTEC participates in various recruiting activities. For example, RoTEC has a 5-5-5 Summer Program that include 5 days exploring 5 industries for students in Grade 5. In the area of automotive technology, children learn to change tires and oil, operate the car lift, and experience some of the workday events of a service technician. There is also a middle school career explorations course at Grades 6 and 8. In Grade 7, students work with school counselors, parents, and staff to develop a college and career plan required for graduation. As well as active recruiting practices, the school collects data on student selection and retention. RoTEC receives far more applicants than the school can accommodate. Some programs receive applications at 2–3 times capacity. Currently, many applicants are denied entry. For example, the Level I Culinary Arts program often has 300+ applicants for 20 possible seats.

Enrollment by cluster is reported in the *Course Cluster and Total Enrollment* table below. Manufacturing (177) is the largest cluster area, followed by Information Technology (107), and Health (98). Looking at program enrollment in the *Program and Enrollment* table, Welding (136) is the largest program by enrollment, followed by Pre-Engineering (124) and Business Information Technology (122).

Course Cluster and Total Enrollment

Cluster	Enrollment
Business, Management & Administration	15
Construction	47
Health	98
Information Technology	107
Manufacturing	177
STEM	83
Transportation	32
Grand Total	559

Program and Enrollment

Program	Enrollment
Architecture and Construction	47
Automotive Technology	32
Business Information Technology	122
Health and Medical Sciences	98
Pre-Engineering	124
Welding	136
Grand Total	559

Program, Course Name, Cluster, and Enrollment Data

Program	Course Name	Cluster	Enrollment
Architecture and Construction	Carpentry I	Construction	15
Architecture and Construction	Carpentry III	Construction	32
Automotive Technology	Auto Tech I	Transportation	25
Automotive Technology	Auto Tech III	Transportation	7
Business Information Technology	Business Cooperative Education	Business, Management & Administration	15
Business Information Technology	Computer Information System	Information Technology	35
Business Information Technology	Cybersecurity Fundamentals	Information Technology	10
Business Information Technology	Programming	Information Technology	22
Business Information Technology	Programming - Adv	Information Technology	40
Health and Medical Sciences	Health Assisting Careers	Health	14
Health and Medical Sciences	Intro to Health Science - 18 weeks	Health	0
Health and Medical Sciences	Medical Terminology - 18 weeks	Health	57
Health and Medical Sciences	Nurse Aide II	Health	27
Pre-Engineering	Precision machining I	Manufacturing	41
Pre-Engineering	Engineering I Explorations	STEM	51
Pre-Engineering	Engineering II Analysis and Applications	STEM	23
Pre-Engineering	Engineering III Concepts and Processes	STEM	9
Welding	Welding I	Manufacturing	14
Welding	Welding III	Manufacturing	122

CTE Advisory Council and Business/Industry Involvement

CTE programs are required to have advisors from external industries boards, and committees. The Roanoke City Public School district has a CTE Advisory Council that

consists of 26 members. The members of the Advisory Committee are listed below with their affiliations. As well as the Roanoke City Public Schools CTE Advisory Council Members, RoTEC also has a CTE advisory committee that advises, assists, and provides support and advocacy to the school in their effort to give students a high-quality preparatory experience into post-secondary fields.

2019-2020 Roanoke City Public Schools CTE Advisory Council Members

Joyce	Bell	Richfield Living
Yvonne	Campbell	VWCC, Interim Dean of Business, Technology and Trades
John (Dr.)	Cook	Radford University Carilion
Ray	Cotter	RoTEC Teacher Representative, Engineering
Aveyun	Creasy	RoTEC Student Representative
Linda	Davis	RoTEC Business Liaison
Kathy	Duncan	RoTEC Principal/CTE Director
Terry	Durkin	Roanoke Regional Chamber of Commerce
Linda	English	RoTEC Parent Representative
Tre	English	RoTEC Student Representative
Dave	Epperly	Red Canary
Jeanne	Hatter	Springtree Health and Rehabilitation Center
Tom	Henzey	MFA
Dan	Hughes	CTE Foundation Board
LaKisha	Kyle	Forest Park Academy
Amy	Lowman	Roanoke Regional Home Builders' Association, Inc.
Jamal	Millner	M3: GRAFIX
Nicole	Ross	Goodwill Industries of the Valley
Lutheria	Smith	Roanoke City School Board
Michelle	Smith	RoTEC School Counselor
Wayne	Strickland	Roanoke Valley-Alleghany Regional Commission
Sandy	Workman	VWCC, Program Coordinator, Workforce Development
Emily	Zido	Junior Achievement
Rita (Dr.)	Bishop	Roanoke City Public Schools Superintendent
Dan (Dr.)	Lyons	Roanoke City Public Schools Deputy Superintendent
Laura	Kelly	Roanoke City Public Schools Supervisor: Gifted Programs

Advisors and business partners were evident throughout all programs. RoTEC teachers knew the local businesses and the business partners that support RoTEC programs through equipment donations, information on new technologies or changes in industries, and participation with students as a speaker, a supporter of CTSOs, or as an employer of the student. The teachers played a critical role in bringing business and industry closer to the students and instructors. Of note is a Ford dealer who donated a new Ford Fiesta for students to learn the components of current cars. Carilion supports the Healthcare course by providing equipment, work-based learning opportunities, and a formal partnership agreement. Additionally, the local Associated General Contractors (AGS) serves as advisors and partners. Advisors serve as CTSO supporters and judges, guest speakers, and mentors. They also provide support during industry tours and on career days and other similar activities.

Student Support and Leadership Development

Students at RoTEC may participate in their program's associated CTSOs. Students learn leadership skills, compete at state and national levels, hold office, and organize events. Through participation in co-curricular and after-school activities and programs to competitive events where students demonstrate their skills, students network with students from other schools as well as industry partners, which has the potential to jumpstart their careers through building professional relationships. Having CTSO membership listed on a resume can be an advantage when applying for a job, especially if students were in a leadership role. RoTEC's CTSOs are:

- Distributive Education Clubs of America (DECA)
- Future Business Leaders of America (FBLA)
- Family, Career and Community Leaders of America (FCCLA)
- Educators Rising (formerly known as Future Educators Association—FEA)
- Health Occupations Students of America (HOSA)
- SkillsUSA
- Technology Student Association (TSA)

Due to school closures caused by COVID-19, all CTSO regional activities have been cancelled. RoTEC had planned to host the SkillsUSA state competition, which typically occurs in April.

Starting with the SY 2020-21 budget, it is expected that Roanoke City Public Schools will allocate one full-time position for a workplace learning coordinator and adult apprenticeship program. This will provide additional student and administrative support to assure increased opportunities for students to participate in CTSOs.

Programs in Detail

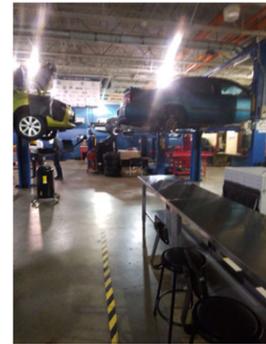
All programs at RoTEC offer students the opportunity to earn industry certifications within their program of study. Students attend classes at the Gibboney Center (located on the campus of Patrick Henry High School) for courses that require a lab setting. Additional CTE courses are taught at the William Fleming, Patrick Henry, Noel C. Taylor, and Forest Park High School campuses. Students can explore a variety of careers with programs offered in Building Trades, Culinary Arts, Medical Sciences, Pre-Engineering, Teaching, TV/Video Production, Computer Applications, Robotics, Cosmetology, Automotive Repair, Web Design, and a variety of courses in the areas of Business and Marketing. When the SEG team visited RoTEC, teachers were busy adapting their remaining lessons online due to school closures related to COVID-19.

Architecture and Construction includes the carpentry program and is in the process of change. Through a sequence of three courses (*Carpentry I, II, and III*), students learn construction industry skills, safety, safe use of hand and power tools, and how to read blueprints and apply construction math. Generally, the work is centered on residential construction practices from foundation to complete building. Students build sheds and do remodeling on existing structures on the school site. For instance, students add a dormer to a roof of an existing shed which is intended to broaden their skills. The sheds are sometimes sold.



- **Observations:** In review of the shop, the teacher does all the things employers expect. The shop is clean, well-organized, has appropriate safety notifications and processes, and has the look of a professional cabinet shop. The instructor is attending apprenticeship classes to certify and be able to add other building trades such as electrical, HVAC, and plumbing.

Automotive Technology is a 2- to 3-year NATEF and ASE Certification program that prepares students for entry-level employment, and/or for entry into post-secondary education at the apprentice, certificate, or associate's level. Students may earn a minimum of 4 or as many as all 9 ASE certifications, workplace readiness, and safety credentials; one student graduated with 14 industry credentials. Students enrolled in this program learn the basics of hand and power tools; electrical systems for the automobile, heating, ventilation, and cooling systems; general engine operation and repair; and drive train operating systems. Courses are *Automotive Technology I, II, and III*. Business partners and advisors include Advance Auto, Magic City Ford, Firestone, First Team, and O'Reilly's Auto parts. Students are working at all partner sites.



- **Observations:** The shop is large with 8 bays. Advance Auto donated a tire changer, scanner, and small specialty tools. As mentioned, Magic City Ford donated a Ford Fiesta for students to learn about new cars and how they differ from older models. Additionally, beginning-level students learn skills like detailing. Some of them are employed making \$15-16 per hour detailing cars; one student started his own business.

Business and Information Technology students learn programming skills, algorithmic procedures, and common programming languages. Students might start with a course designed to improve proper keyboarding techniques, learn graphics, telecommunications, and Microsoft Office. Later, they might learn basic business processes, start a 2-year web design sequence, or a 2-year programming sequence. The Cybersecurity course is sequenced with game design and programming, which mimics the industry. There are a number of courses available: Digital Applications; Entertainment Design and Technology; Coding and Game Design I & II; Computer Information Systems; Principles of Business and Marketing; Design, Multimedia, and Web Technologies I & II; Cybersecurity Fundamentals; and Business Cooperative Education.



Healthcare and Medical Sciences students must first interview with one of the program's instructors and successfully complete Introduction to Health Careers. They are assessed on their overall academics, conduct, and workplace readiness. The introductory course allows students to survey health careers and develop basic skills found in all medical jobs. The health assistant course begins the path to employment and studies of the body, principles associated with health professions, and an overview of the national healthcare system. Students then choose a profession: Nurse Aide, EMT, or Sports Medicine (athletic training). Courses include EMT I & II, Intro to Health Careers, Health Assistant, Medical Terminology, Nurse Aide I & II, and Sports Medicine I & II.



- **Observations:**
 - There is a large need for Certified Nursing Assistants (CNAs). RoTEC has the only high school CNA program accredited by the Virginia Department of Health Professions State Board of Nursing in the region. This designation means that RoTEC CNAs who pass their exam may enter the workforce without additional training. Moreover, Spring Tree Health and Rehab, a Medical Facilities of America (MFA) facility and business partner and advisor has a standing offer that any student who passes the CNA has an automatic offer of employment. MFA is the largest employer of CNAs in Virginia and needs 300+ CNAs now.
 - A new law could come into effect for SY2021-22, bringing a change from a teacher–student ratio of 1:20 down to 1:10. If passed, this will present a considerable financial constraint for RoTEC.
 - There is a new partnership with Roanoke Fire and Emergency Medical Service supported and led by Chief Kovac. In the EMT program, 10–15 students per year qualify for state exam. In addition, RoTEC developed a partnership with VWCC for dual enrollment. Medical Terminology is a yearlong dually enrolled course with VWCC. Students earn 6 credits for VWCC Courses, HLT 123 & HLT 124.

Manufacturing is a combination of Technology Education and Trades and Industrial program areas as well as a merge of Manufacturing and STEM career clusters. Students may earn 3 or 4 credits that articulate to the Mechatronics program at VWCC as non-transferable credit toward a 4-year degree, but a faster track to employment. Students can earn SolidWorks Associate certification in this high school program, which, comparatively, VWCC students earn at the end of their 2-year program. Courses include Engineering I: Explorations; Engineering II: Analysis and Applications; Engineering III: Concepts and Processes; Motorsports; Precision Machining; Welding I, II, & III; and Manufacturing Independent Study.

- **Observations:**

- The Welding program is an AWS certification program with 14 booths for students. All booths were equipped to be multi-process, providing some program agility. The shop has some Lincoln welders that the instructor felt were not up to current industry standards.
- Precision Machining was also housed in the Welding shop, with a considerable amount of modern industry equipment and some older equipment, good spacing, and product throughput (input, process, output).
- Training was designed to flow through the stages of learning, and students were able to see the industry processes learning required. Signage to indicate process flow was limited and could be improved. There was ample evidence that employers were involved in the training process.
- Newport News Shipbuilding actively recruits graduate from the RoTEC welding program. One student has a partnership with a local company to start a plastic welding business. The company will send him to school for 2 years.



Other Programs:

Family and Consumer Sciences (FACS): Culinary Arts I, II, & III, Teachers for Tomorrow I & II

Marketing: Marketing, Advanced Marketing (Co-op), Fashion Marketing, Sports and Entertainment Marketing

Special Programs: Leadership Development, Work-based Learning

Trade & Industrial: Commercial Photography I & II; Cosmetology I, II & III; Entertainment Design and Technology; TV/Video Production I, II,



& III. Note: Commercial Photography and Theater Entertainment Design expand visual arts by partnering with other departments.

Other Information:

- Transportation is a barrier to student participation in programs and work-based learning. If a student is working construction and has to be at work by 7:30 AM or earlier, there is no regional or school transportation available. Similarly, if students work at Carilion Clinic or long-term care facilities, fulfilling requirements for clinical hours in the evening from 4:30–9:00, transportation is not available. This creates a challenge to meeting the CNA shortage and providing student employment opportunities. This is particularly important because 76% of RoTEC students qualify for free or reduced-price lunch, a federal poverty indicator.
- The CTE Director reported there are not enough school buses to get students to school, so adding additional routes is not a feasible option. Transportation is a barrier to employment and preparation as well as dual enrollment at VWCC, clinical hours at medical facilities, cooperative education, and other work based-learning opportunities. School staff often take students home in their cars at night because the students have no other mode of transportation if they participate in CTE work-based learning or take an extra class. However, in SY2019-20, there were 15 Co-op students, 189 students in service learning, and 30 students gaining clinical experience.
- There is a perceived need to build another technical center at William Fleming High School to duplicate programs in RoTEC. The CTE Director welcomes a regional technical center that would expand program access for Roanoke City students and increase offerings in HVAC Mechanic and Diesel Mechanic. Diesel engine repair is important because a new interstate in the area is under construction. The Virginia Department of Transportation has plans to expand the I-81 corridor. These programs are very expensive and regional monetary support would increase student access. The CTE Administrator, Roanoke City Vice Mayor, and Roanoke Public Schools School Board member agree that Fleming High School would be a great location for a regional center. It has what is considered an ideal location as it is near I-81, the airport, and Woodhaven industrial park, providing easy access to regional schools and local industry.
- There is perceived student interest in construction careers. From SY2017-18 to SY2019-20, over 430 students entered an apprenticeship in the building trades (an average of 145 new apprentices/year).

Salem High School

Site visit conducted on March 9, 2020.

Context

Salem High School (SHS) is an accredited International Baccalaureate (IB) school founded in 1977 and located in the city of Salem, Virginia, in proximity to the City of Roanoke. The Salem City Schools division was founded in 1983. Students participate in VWCC Regional Academies.



Program Overview

CTE programs at SHS graduate approximately 90 students per year with a year-on-year CTE program completer graduation rate around 100%. SHS programs prepare students for direct entry into the workforce after high school and for advanced study leading to a college degree. These programs include a combination of academic and technical courses providing the knowledge and skills needed for business and industry. SHS offers CTE courses on site and students attend VWCC for programs not offered on site.

CTE programs range from Mechatronics to Health Sciences; a comprehensive list of programs in the VWCC Regional Academies is presented in the *VWCC Regional Academy Programs and Certifications* table below. In addition to the Regional Academies, students at SHS can participate in CTE courses, such as Auto Body and Architectural Drawing.

VWCC Regional Academy Programs and Certifications

Programs	Certifications
Air Conditioning & Refrigeration	
Billing & Pharmacy Tech	
Engineering	
Health Science Program	
Mechatronics	Prepares students for Siemens Mechatronics System certification
Nurse Aide	Certified Nursing Assistant (CNA) Certification
Pre-Health	

A sample list of other programs is presented in the *CTE Programs Offered at Salem High School* table below.

CTE Programs Offered at Salem High School

Program	Sample Courses	Opportunities
Business Education	Digital Law Business Applications	Building portfolios Apprenticeship Senior Pathway Project Job Shadowing
Computer Science	Computer Science Education Introduction to Game Design	Work study program: Cooperative Office Education (COE) Apprenticeship Senior Pathway Project Job Shadowing
Family & Consumer Sciences	Culinary Essentials Early Childhood Education I	Internship Apprenticeship Senior Pathway Project Job Shadowing
Marketing	Intro: Sports and Entertainment Intro: Fashion Advanced Marketing	Customer Service and Professional Sales certifications Co-op (Internship) Apprenticeship Senior Pathway Project Job Shadowing
Technology Education	Engineer Drawing Mechatronics Robotics	Internship Apprenticeship Senior Pathway Project Job Shadowing
Trades & Industrial Education	Auto Body I Welding I Precision Machining I* New 2020-21 (through Workforce Development/VWCC) Cosmetology*	Co-Op/Internships Workplace Simulations Apprenticeship Senior Pathway Project Job Shadowing

* New SY2020-21 (through Workforce Development/VWCC)

Program Enrollment

The VDOE reports a fall school membership count of 1,253 for the fall 2019 term at SHS. Enrollment has remained fairly constant during the past 10 years; the fall 2010 membership count was 1,267.

Current CTE program cluster enrollment at SHS is presented in the *Program Cluster and Enrollment* table. Transportation (68) is the largest program by enrollment, followed by Manufacturing (43) and Construction (39). Staff reported that CTE students must take a college placement test for dual enrollment courses. Additionally, if students are interested in taking colleges placement tests, they must fill out a VWCC application.

Program Cluster and Enrollment

Program Cluster	Enrollment
Construction	39
IT	4
Manufacturing	43
Transportation	68
Grand Total	154

A more detailed view into current course enrollment by program is the *Course Name, Cluster, and Total* table. The Auto Tech I course (29) has the largest enrollment count of all programs, followed by Basic Technical Drawing (27), Auto Body I (19), and Welding I (18).

Course Name	Cluster	Total
Architectural Drawing	Construction	8
Auto Body I	Transportation	19
Auto Body II/III	Transportation	6
Auto Tech I	Transportation	29
Auto Tech II/III	Transportation	12
Basic Technical Drawing	Construction	27
Diesel Equipment Technology	Transportation	3
Engineering Drawing	Construction	2
Manufacturing Systems I	Manufacturing	8
Programming	IT	4
Welding I	Manufacturing	18
Welding II/III	Manufacturing	6

CTE Advisory Committee and Business/Industry Involvement

CTE programs are required to have advisors from external industries boards, and committees. Salem City Schools has a CTE Advisory Committee that consists of 19 members. The members of the Advisory Committee are listed below with their affiliations.

2019-2020 Salem City Schools CTE Advisory Committee Members

Richard Smith Spartan	Silk Screen
Joel Brinley	International Brotherhood of Electrical Workers
Ronnie Beckner	James T. Davis Paint Company
Wayne Adkins	Salem Economic Development Board
Chris Wilkes	Parent
Elizabeth Arthur	Salem City Schools
Randy Jennings	Salem City Schools
Yvonne Campbell	VWCC
Will Hicks	Salem High School
Allison Netting	Saint Anne's Preschool
Morgan Romeo	Virginia Career Works
Josh Graham	Salem High School
Lori Wright	Lakeside Baptist Church
Janie Whitlow	Real Estate Agent
Kris Harless	Salem High School

At SHS, job-shadowing, mentoring, and advisory activities facilitated by local business and industry representatives occur. Minutes of meetings demonstrate advisors' interest and activity. Advisors make it a priority to visit the programs, provide feedback, and help establish apprenticeships. Advisors also visit classrooms twice each year. CTE staff help define employment trends, apprenticeships, co-op employers in community, and meet student needs outside of school. SHS has multiple job shadowing opportunities. In the fall, all students in Grades 9-12 have the opportunity to job-shadow, and seniors have an additional opportunity with an entire day allotted to job shadowing.

Salem City Schools has many industry partners due in part to outreach efforts by CTE Advisors. Blue Ridge Paint is one example of a combined effort with Roanoke County Public Schools to create apprenticeship opportunities. Blue Ridge Paint is in the process of working with the Department of Labor and Industry to create apprenticeships. Salem City Schools created a Workforce Coordinator position to support outreach efforts. Most industry partnerships are not written agreements, but Jamie Soltis and Wayne Adkins visited some 30 different businesses, creating pathway projects and agreements with employers for internships and job shadowing. These meetings helped students attain job opportunities, potential internships/externships, job shadowing, cooperative education, and student pathway opportunities.

Beginning in SY2019-20, advisors are helping answer questions such as: What do we need to do to improve? What is outdated? What needs to change? Employers want to help steer the CTE programs with the understanding that Salem is limited by its size. Other challenges include the school division's inability to provide short-term training solutions for industry partners, have small class sizes, and organizational resistance to change. Advisors have not yet asked Salem to start any specific program.

Industry and business advisors also provide input for the curriculum content. In addition, they provide resources, materials, and guidance in IT, automotive, and welding.

Student Support and Leadership Development

Students are encouraged to join CTSOs based on the various courses they take. For instance, students who take Culinary Essentials are encouraged to participate in SkillsUSA. Students who take Marketing courses are invited to join DECA. Those in education courses are given the suggestion to become a member of Family, Career, & Community Leaders of America (FCCLA). SHS also has school counselors who interact with students and advise them on career, social, emotional, and academic goals.

Programs in Detail

Drafting and Robotics provides students with hands-on learning via the following courses: *Technology of Robotic Design*, *Manufacturing Systems I*, *Technical Drawing and Design*, *Architectural Drawing and Design*, and *Engineering Studies*. Students solve problems and can serve as mentors once they are in more advanced courses.

- **Observations:** The students were working on computers. The room was in the process of packing up to move to a new location and therefore demonstrated a limited perspective of the goals of the staff, as explained during the visit. Robotics was a dominant theme, with up to 45 sponsors from within the community supporting FIRST Robotics.

Automotive courses give students chances to engage in hands-on activities that will lead to high quality knowledge and certifications in the field. Courses are: *Introduction to Automotive Technology* and *Automotive Technology I and II*.

- **Observations:**
 - The shop is organized along the lines of an older, small automobile facility but still provides the feel for how smaller shops operate. A strong positive is that classes appear to be run and organized using a business model, with students fulfilling operational and management roles.
 - The shop is compact and crowded with vehicles for projects, to the point it was overflowing into the parking lot. Machinery seemed to be in serviceable condition, with some minor concerns, but was a reasonable representation of an employer's workspace. Safe practices were generally prevalent with industry messages and practices.
 - Equipment is not overly outdated, and the instructor has negotiated for an up-to-date paint booth facility. The instructor is soliciting for the ability to instruct on hybrid vehicles.
 - The instructor is in regular contact with industry partners who provide relevant resources, including diesel. The best examples are the training support materials, engines, and a vehicle provided by UPS and FedEx.
 - Students participate in Skills USA. Cooperative education is available, and there is support from Toyota and Honda.
 - Students receive a Workplace Readiness Certificate in addition to automotive certificates (ASE). Students can use virtual learning resources to make up missed classes.
 - Students are made aware of the careers available and this is graphically portrayed in the shop. Up to 80% of students receive job offers on or before graduation.

Trades & Industrial Education courses encourage students to create and build. Students work on projects and have hands-on experiences. Courses are: *Automotive Technology I and II, Diesel Equipment Technology, Welding I, and III, and Auto Body I and II.*

- **Observations:**
 - The welding workshop is somewhat crowded, but much of that pertains to the students' manufacturing products for resale to raise funds, namely trailers.
 - Most of the welding training is accomplished through the production of coupons (small, low cost metal pieces), and focuses on stick, MIG, and Flux-Cored welding processes.
 - Career pathways are posted (Hobart and Tulsa). Students can move on to courses and programs at VWCC. Credentials focus on AWS fundamentals. Associations with local companies include Carter CAT and AITECH. Almost all students can find jobs in the community.

Other Programs/CTE Courses

Business and Information Technology students are given opportunities to earn various certifications and engage in internships and co-ops.

- Courses: *Accounting, Business Law, Computer Information Systems, Design, Multimedia and Web Tech I & II, Digital Applications, IB Business Management*

Computer Science includes internships and certification prospects for students.

- Courses: *Computer Science Foundations, AP Computer Science, Foundations of Cybersecurity, Intro to Game Design, Mobile Apps*

Family and Consumer Sciences (FACS) students engage in hands-on projects and interact with industry professionals in internships. They can also earn certifications.

- Courses: *Exploring Foods, Gourmet Cuisine, Culinary Essentials, Early Childhood Intro, I & II, FACS Internship*

Technology Education allows students to work on projects that simulate real-world careers. They can also earn certifications and engage in work-study programs.

- Courses: *Architectural Drawing, Basic Technical Drawing, Engineering Drawing, Mechatronics, Robotics I, Robotics Internship*

Dabney S. Lancaster Community College

Site visit held on March 11, 2020.

Context

Founded in 1962, DSLCC is a public 2-year post-secondary school and one of 23 public community colleges in Virginia. Dr. John L. Rainone is the current President of the college. DSLCC is located in the Alleghany Highlands of Virginia. It is a workforce-oriented school with campuses in Clifton Forge and Buena Vista. The service area includes the cities of Buena Vista, Covington, and Lexington, and the communities in Alleghany, Bath, Botetourt, and Rockbridge counties. DSLCC offers over 85 programs including 17 certificate programs, 6 Associate Degree programs, and 13 non-credit programs.



DSLCC sponsors a wide array of cultural events and educational and training programs that address changing workforce demands, and provides facilities for research, recreation, and social interaction. Working closely with representatives of business and industry, government, various professions, and other educational institutions, DSLCC prepares individuals to experience academic, career, and personal success.

Program Overview

DSLCC is accredited by the Southern Association of Colleges and Schools Commission on Colleges to award Associate Degrees in Arts and Sciences and Applied Sciences. DSLCC is approved by the U.S. Department of Education for various federal funding programs, including Veterans Administration educational assistance. The College is an institutional member of the American Association of Community Colleges. The College's Associate Degree Nursing program is accredited by the Accreditation Commission for Education in Nursing, the Forestry Technology program is accredited by the Society of American Foresters, and the Culinary Arts and Management program is accredited by the American Culinary Federation.

Each program has a degree, certification, license, or other credential associated with it. The term credential refers to any or all earned qualification required to enter employment (license, certificate, etc.) Degree programs are typically set on a 2-year time frame with transferable credit options to 4-year programs. Program courses may be dually enrolled in high schools within the DSLCC service area. These may also equate to 1+1+2 = bachelor's degree (some form of pre-requisite work in high school plus dual enrollment credit plus DSLCC coursework to earn a degree or credential).

DSLCC offers programs in high demand careers and to meet workforce needs. A comprehensive list of programs relevant to this study is presented below.

Business

- Administrative Support Technology
- Business Administration
- Business Administration with a Specialization in Business Foundations
- Business Fundamentals
- Business Management
- Business Management with a Specialization in Administrative Support
- Non-Profit Management
- Office Skills
- Small Business Management

Culinary Arts & Hospitality

- Baking & Pastry Arts
- Culinary Arts
- Culinary Arts and Management
- Hospitality Management
- Hospitality Services

FastForward

Several areas of study benefit from the FastForward program, which funds students enrolled in fast-track training programs in high-demand jobs. This program was launched at DSLCC in 2016.¹

- Certified Nurse Aide Program
- Clinical Medical Assistant Program
- Heating, Ventilation, Air Conditioning, and Refrigeration Level 1
- Phlebotomy Technician
- NCCER Electrical
- NCCER Industrial Maintenance Mechanic
- Commercial Driver's License
- Welding Basics

Forestry & Agriculture

- Forest Management Technology
- Sustainable Agriculture
- Sustainable Agriculture and Horticulture
- Urban Forestry
- Wilderness Emergency Management

¹ <https://www.dslcc.edu/fastforward-makes-training-affordable-dslcc>

Information Technology, Math, & Science

- Computer Technology
- Cybersecurity
- Cybersecurity and Networking Foundations
- Cybersecurity and Networking Intermediate
- Information Systems Technology
- Microcomputer Operations
- Networking Technologies
- PC Repair
- Science and Mathematics
- Science: Arts and Sciences (AA&S Degree)
- Web Page Design

Manufacturing

- Advanced Manufacturing Fundamentals
- Advanced Manufacturing Technology
- Basic Electronics and Electrical Troubleshooting
- Electrical and Instrumentation Technology
- Electrical Troubleshooting
- Electrical Wiring Fundamentals
- Instrumentation Technology Fundamentals

Manufacturing & Skilled Trades

- FCAW Welding Basics Program
- GMAW Welding Basics Program
- Practical Electrical Technicians

Nursing & Healthcare

- Advanced Health Care
- CPR: Advanced Cardiac Life Support
- CPR: Basic Life Support
- CPR: Pediatric Advanced Life Support
- CPR: Prehospital Trauma Life Support
- Dental Assistant
- Licensed Massage Therapist Program
- Nursing (ADN)
- Pharmacy Technician
- Phlebotomy Technician
- Practical Nursing
- Practical Nursing (PN) to Registered Nursing (RN) Pathway Course

Public Service

- Emergency Medical Services: Basic
- Foundation of Criminal Justice Career Studies Certificate

- Law Enforcement
- Private Security Service
- Small Unmanned Systems: FAA Part 107 Certification

Short-term Training

- Commercial Driver's License Program: Class A
- Industrial Maintenance Mechanic
- NCCER Core: Introduction to Skilled Trades
- Personal Development
- Welding Basics: GTAW–TIG Welding
- Welding Basics: SMAW/Stick Welding

Skilled Trades

- Career Readiness Certificate
- Electrical Level 1 Program
- EPA 608 Universal Technician Certification
- Heating, Ventilation, Air Conditioning, and Refrigeration Fundamentals
- Industrial/Structural Welding
- OSHA 10-Hour Outreach Training: for Construction
- OSHA 10-Hour Outreach Training: for General Industry
- Pipe Welding
- Practical Electronics Technician
- Renewable Energy Technology Fundamentals
- Unmanned Aerial Systems Maintenance and Operations
- Welding

Program Enrollment

DSLCC's profile at SCHEV reports an overall fall headcount of 1,032 for the fall 2019 term. DSLCC experienced a 32.1% decrease in student enrollment since fall 2010. Enrollment declines were steepest for students enrolled in certificate programs (–80.1%).² The *Program or Area of Study and Student Enrollment* table below displays student enrollment numbers.

Program or Area of Study and Student Enrollment

Program or Area of Study	Total Enrollment
Architecture & Construction	59
Electrical	11
HVAC	22

² <https://research.schev.edu/iProfile/231873/Dabney-S.-Lancaster-Community-College>

Industrial Maintenance Mechanic	11
NCCER Core Curriculum	15
Health Sciences	161
Advanced Healthcare	15
Certified Medical Assisting	22
CNA	7
Emergency Medical Technician	14
Massage Therapy	19
Pharmacy Technician	10
Phlebotomy Technician	14
Practical Nursing	16
Registered Nursing	44
Information Technology	12
Cybersecurity	2
Information Systems Technology	10
Manufacturing	63
Electrical & Instrumentation	33
Pipe Welding	3
Welding: FCAW	3
Welding: GMAW	3
Welding: GTAW	6
Welding: Industrial/Structural Welding	6
Welding: SMAW	9
Transportation, Distribution, & Logistics	56
Commercial Driver's License (Class A)	56
Grand Total	351

The Virginia Governor's G3 ("Get Skilled, Get a Job, Give Back") initiative, announced in December 2019, will make community college tuition-free to low- and middle-income students pursuing jobs in high-demand fields. This initiative is expected to increase community college enrollment across the state when it launches in fall 2020.

Advisors and Business Partners

DSLCC believes the most effective workforce training comes from a true working relationship between employer and trainer. Training programs are customized to support business partners' specific needs. DSLCC will find resources to support employers and business partners. DSLCC leverages training by reaching out to other Virginia post-secondary institutions that may have expertise or equipment for specific

employer needs. DSLCC designs entirely new programs that address specific training criteria or customizes courses from one of their current offerings. DSLCC business partners include West Rock Paper Mill, SchaeferRolls, Garten Trucking, Easy Pass, Agri Feed, Carilion Clinic, Everbrite, Modine Love's, and Munters, all of which require training for their employees.

Staff reported helping employers and business partners in the following areas:

- Training needs assessment
- Job analysis
- Training plan development
- Course delivery
- Evaluation and continuous support
- Flexible Delivery

Student Supports

According to their website, the college has a student to faculty ratio of 14:1, which is lower than the state community college student to faculty average.

DSLCC's Statement of Values stresses that the heart and soul of the college is learning and personal growth. DSLCC strives to fully meet the diverse needs of everyone they serve and those whom they hope to serve in the future. Resources unique to DSLCC include:

- **Academic and Career Advising.** DSLCC provides academic advisors, who work with students to make informed decisions about vocational and education plan, providing support with course selection, academic and career planning, planning for transfer to 4-year institutions, and addressing issues related to student success.
- **Career Coaches.** DSLCC partners with school divisions in Alleghany, Bath, Botetourt, and Rockbridge County, as well as the cities of Covington and Buena Vista, to provide career coaching services in area high schools. Career Coaches provide individual and small group career assessments to assist students in defining pathways based on 16 career clusters.
- The **DSLCC Writing Center** provides students with a friendly supportive team to help them succeed at college level writing.
- **Educational Talent Search** serves students within DSLCC service area high schools that are identified as potential first-generation college students and is designed to encourage and support students in Grades 7–12, as well as high school dropouts or post-secondary stop-outs, to continue their education. The goal of Educational Talent Search is to increase the number of individuals who complete high school and enroll in the post-secondary education institution of their choice.
- **Student Support Services (SSS)** is a federally funded TRiO program designed to provide free academic support and encouragement to students who face

economic, social, and cultural barriers to higher education. As a college retention program, SSS helps students meet the rigors of higher education and graduate from DSLCC.

- **The Roadrunner Cubby Closet** is a food pantry for DSLCC students, established in the DSLCC Armory on the main campus in Clifton Forge. Dr. Rainone is quoted as saying, “those students who were hungry in high school are also hungry in college.”
- The **DSLCC work study program** pays higher wages and offers more schedule flexibility for students compared to traditional part-time and entry-level jobs. For example, fast food restaurants pay \$7.25/hour. DSLCC work study pays \$8.00/hour.

Site Visit Observations

The campus is relatively small, with six buildings. The team met in the Administration Building (Backels Hall), which houses nursing labs, and visited four other buildings: Scott Hall, which houses industrial labs; The Armory, which houses Electrical, Instrumentation, and Mechatronics; Warren Hall, which houses Computer and Administration of Justice; and McCarthy Hall, which houses workforce programs including healthcare and CDL.

Healthcare programs prepare students for careers in roles like Certified Medical Assistant, Massage Therapist, Nurse (ADN), Pharmacy Technician, Phlebotomist, and Practical Nurse, with a pathway plan from Practical Nursing to ADN. Courses are listed in the *Healthcare Program and Courses* table.

Healthcare Program and Courses

Program	Courses
Certified Medical Assistant	Clinical Medical Assistant Clinical Rotation
Massage Therapy	Introduction to Massage Therapeutic Massage I (Lecture) Therapeutic Massage I (Lab) Musculoskeletal Structure/Function (Lecture) Musculoskeletal Structure/Function (Lab) Therapeutic Massage II (Lecture) Therapeutic Massage II (Lab) Therapeutic Massage III (Lecture) Therapeutic Massage III (Lab) Eastern/Asian Bodywork Exercise Science
Nursing (ADN)	Anatomy & Physiology I and II Intro to Nursing Concepts Competencies for Nursing Practice Professional Nursing Concepts

	Health Promotion and Assessment Introductory Microbiology Health Care Participant Health/Illness Concepts Healthcare Concepts I and II Advanced Professional Nursing Concepts Complex Health Care Concepts
Pharmacy Technician	Pharmacy Technician
Phlebotomy	Phlebotomy Technician Clinical Rotation
Practical Nursing	Basic Occupational Communications Introduction to Computer Apps & Concepts Drug Dosage & Calculations Nutrition and Diet Therapy Trends in Practical Nursing Mental Health & Psychiatric Nursing Orientation to Practical Nursing Practical Nursing Health & Disease I and II Nursing Skills I and II Body Structure and Function Clinical Experience I and II Care of Maternal, Newborn and Pediatric Patients Pharmacology for Practical Nursing

- **Observations:** The Nursing program was housed in a well-equipped classroom and lab with industry partner information posted. Students use computerized patient simulators.

Manufacturing & Skilled Trades prepares students in Advanced Manufacturing Fundamentals, Advanced Manufacturing Technology, Basic Electronics and Electrical Troubleshooting, Electrical Troubleshooting, Electrical Wiring Fundamentals, Electrical and Instrumentation Technology—Technical Studies Degree, Electrical, Heating, Ventilation, Air Conditioning and Refrigeration Fundamentals, Industrial Maintenance Mechanic, Industrial/Structural Welding, Instrumentation Technology Fundamentals, Pipe Welding, Practical Electrical Technicians, Practical Electronics Technicians, Renewable Energy Technology Fundamentals, Unmanned Aerial Systems Maintenance and Operations, Welding Basics—FCAW—Flux Core Welding, Welding Basics—GMAW—MIG Welding, Welding Basics—GTAW—TIG Welding, Welding Basics—Stick Welding, and Welding. Courses are listed in the *Manufacturing & Skilled Trades Program and Courses* table.

Manufacturing & Skilled Trades Program and Courses

Program	Courses
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Advanced Manufacturing Fundamentals	AC and DC Fundamentals Industrial Engineering Technology Technical Computer Applications Technical Mathematics Electrical Power and Control Systems Programmable Controllers Materials and Processes in Manufacturing I Principles and Applications of Mechatronics Basic Fluid Mechanics Hydraulics/Pneumatics
Advanced Manufacturing Technology	Technical Mathematics Industrial Engineering Tech. Technical Computer Applications AC and DC Circuit Fundamentals Electrical Power and Control Systems Programmable Controllers Materials and Processes in Manufacturing I Basic Fluid Mechanics Hydraulics/Pneumatics College Composition I Industrial Safety Principles of Applications of Mechatronics College Success Skills
Electrical Wiring Fundamentals	National Electrical Code Review I DC and AC Fundamentals I with Lab Introduction to Computer Apps. & Concepts Technical Mathematics Wiring Methods in Industry with Lab 3 Electrical Control Systems with Lab Industrial Solid State Devices and Circuits with Lab Programmable Controllers with Lab
HVAC Fundamentals	Air Conditioning & Refrigeration I and II Introduction to Construction Basic Electricity and Machinery Circuits and Controls I Heating System I
Industrial Maintenance Mechanic	Industrial Maintenance Mechanic I through 4
Industrial/Structural Welding	Introduction to Welding Industrial Safety (OSHA 10) Construction Safety (OSHA 10) SMAW (Basic) Gas Metal Arc Welding Machine Trade Computations OR Technical Mathematics Gas Tungsten Arc Welding Welding Drawing and Interpretation First Aid/CPR Flux Cored Arc Welding Metallurgy SMAW (Advanced)

	SMAW Capstone OR Advanced Gas Tungsten Arc Welding, Tungsten Inert Gas Occupational English or English Composition I
Instrumentation Technology Fundamentals	DC and AC Fundamentals Introduction to Fluid Powers Instrumentation I and II Technical Mathematics Industrial Solid State Devices and Circuits Programmable Controllers Introduction to Computer Apps. & Concepts
Pipe Welding	Introduction to Welding 2 Industrial Safety (OSHA 10) OR Construction Safety (OSHA) SMAW (Basic) 3 Gas Metal Arc Welding Machine Trade Computations OR Technical Mathematics Gas Tungsten Arc Welding GTAW II (Pipe) 2 First Aid/CPR Metallurgy Flux Cored Pipe Welding I SMAW (Advanced) Occupational English OR English Composition I Pipe and Tube Welding (GTAW) Pipe Welding II Welding Drawing & Interpretation
Practical Electrical Technicians	AC and DC fundamentals College Success Skills Technical Mathematics National Electrical Code Review I Introduction to Computer Applications and Concepts Wiring Methods in Industry Industrial Safety – OSHA 10
Renewable Energy Technology Fundamentals	AC and DC Circuit Fundamentals Intro. To Alternative Energy Including Hybrid Systems Technical Mathematics Energy Management I Programmable Controllers Introduction to Fluid Power Solar Power-Photovoltaic and Thermal Electrical Control Systems
Unmanned Aerial Systems Maintenance and Operations	Small Unmanned Systems Remote Pilot Ground School Small Unmanned Aircraft Systems AC and DC Circuit Fundamentals Small Unmanned Aircraft Systems Components and Maintenance Small Unmanned Aircraft Systems II Industrial Solid State Devices and Circuits

FastForward Credential	Welding Basics - FCAW - Flux Core Welding Welding Basics - GMAW - MIG Welding Welding Basics - GTAW - TIG Welding Welding Basics - Stick Welding
Welding	Introduction to Welding Industrial Safety (OSHA 10) Construction Safety (OSHA 10) Gas Metal Arc Welding Gas Tungsten Arc Welding Welding Drawing and Interpretation Flux Cored Arc Welding

Observations:

- Mechatronics and Electrical share space. The room was crowded and filled with new trainers. The lab could be in an organizing process. The trainers were appropriate to the skills needed in manufacturing.
- The welding lab was organized and had enough equipment to train welders and pipe fitters. These skills are needed in local manufacturing. There should be more safety messaging; however, the overall program was to industry standards and reasonably organized.



Other Information/General Observations

- DSLCC had an Economic Overview & Program Demand Gap Analysis study completed in February 2018. The report describes DSLCC region economic status, a gap analysis, and recommended programs. Given a lack of infrastructure, lack of housing, no public transportation, and high poverty, the report demonstrates that DSLCC is a resource for local residents in the face of many barriers to success in employment. This report also shows that people might need to travel for work in the area.
- DSLCC staff discussed the example of West Rock Paper Mill, the largest employer in the area, which needs electricians and industrial maintenance programs as well as short-term training. Given the paper mill’s workflow, the number of truck drivers has increased. One partner said, “if the material does not show up or products leave on time, our customers will not be customers for long.” Employees of the West Rock Paper Mill and its Low Moor conversion plant require in-house training.
- In response to Covington City becoming a “Drone Zone,” a former primary school in Covington has been converted to a drone research and recreational facility. A grant from the Appalachian Regional Commission will be matched with \$100,000 in local money to complete a feasibility study for what is being called the Allegheny Highlands Drone Zone. Located in the former Edgemont Primary School, the facility would serve as a regional incubator for an emerging industry in which small, unmanned aircraft are used for a variety of purposes, including

delivering packages and taking aerial photographs. DSLCC responded by creating an aerospace and FAA 107 Remote Pilot Certificate program. This program works closely with the college's Forestry program, where drones are used for search and rescue operations, fire survey, and other applications.

- The Omni Homestead partners with DSLCC for culinary arts, hospitality service, electricians, plumbers, and other training of their 140 employees.
- There seems to be a strong and working partnership between K-12 and DSLCC. DSLCC is a small college in a sparsely populated area and has dual enrollment and fair alignment with K-12.

Virginia Western Community College

Site visit conducted on March 10, 2020.

Context

VWCC is a 2-year public institution of higher education operating under the Virginia Community College System. VWCC operates under the policies established by the State Board for Community Colleges and the VWCC Local Advisory Board. VWCC is located on a 70-acre campus in southwest Roanoke, Virginia. The service region of the College includes Roanoke, Salem, Roanoke County, Craig County, Franklin County, and southern Botetourt County.



Program Overview

VWCC is accredited by the Southern Association of Colleges and Schools Commission on Colleges to award associate degrees. The college also holds several program-specific accreditations through the Accreditation Council for Business Schools and Programs, the American Dental Association Commission on Dental Accreditation, the National Accrediting Agency for Clinical Laboratory Sciences, the Joint Review Committee on Education in Radiologic Technology, and the Accreditation Commission for Education in Nursing.

The college is designed around degree-seeking and non-degree-seeking programs. Degree-seeking students can earn associate degrees and participate in programs that are designed for the workforce. They may also take courses to be used as transfer credits for a bachelor's degree. Non-degree-seeking students typically take short-term courses aimed at employability. Students in this program might take one course, a semester of courses, or complete a program over several years to earn credentials. The college also provides short courses and training to meet business and industry short term needs. Both degree-seeking and non-degree-seeking students may earn recognized industry licenses, certifications, and other credentials required by state agencies, employers, and national accreditation agencies. VWCC works with high school students through its dual enrollment program, with some coursework taught in the local high school and some on the VWCC campus.

VWCC offers onsite, offsite, and online programs. Onsite refers to programs that students attend at the main campus. Offsite refers to industry and university partnership programs, such as health care programs, held at a site in another part of VWCC's service area. The areas of study may result in an associate degree, career studies certificate, a fast-track certification, or a professional development course. A comprehensive list of programs relevant to this study is presented below.

Areas of Study

- Automotive
- Building Trades
- Business and Leadership
- Engineering, Mathematics, Mechatronics, and Manufacturing
- Health Professions
- Information Technology (IT)
- Transportation

Fast-track programs offer credit and non-credit courses for business and industry training, retraining and certifications, as well as courses for community and personal enrichment. Selected fast-track programs relevant to this study are presented below.

1–10 Hours

- Building Trades Technology
 - Basic Contractor's Pre-Licensing Class (eligible for licensure exam)
 - Tradesman License Renewal: Electrical, Gas, HVAC, & Plumbing (continuing education hours for licensing)

1–9 Weeks

- Business & Professional Services
 - SHRM CP/SCP Prep (certification available)
- Engineering, Mathematics, Mechatronics, & Manufacturing
 - Basic Manufacturing Skills (multiple credentials available)
 - Introduction to Welding: FCAW (credential available)
 - Introduction to Welding: GMAW (credential available)
- Health Professions
 - Certified Nurse Aide (CNA; certification)
 - Dental Pain Management for Dental Hygienist (certification)
 - Dental Radiation Safety Certification (certification)
 - Medical Office Support (certification available)
 - Medical Billing Support (certification available)
- Information Technology
 - Computer Support and Repair (multiple certifications available)
 - Network and Security (multiple certifications available)
- Transportation
 - Commercial Driver's License

10–16 Weeks (1 Semester)

- Building Trades Technology
 - Maintenance Technology (Career Studies Certificate)
 - Welding (Career Studies Certificate and multiple credentials available)
- Business & Professional Services
 - Legal Office Assisting (Career Studies Certificate)

- Project Management Professional Certification (preparation for certification exam)
- Engineering, Mathematics, Mechatronics, & Manufacturing
 - Industrial Maintenance Technician (multiple credentials available)
 - Machining (multiple credentials available)
- Health Professions
 - Certified Medical Assistant (CCMA; preparation for certification exam)
 - Computed Tomography (Career Studies Certificate)
 - Nurse Aide (Career Studies Certificate)
 - Pharmacy Technician Program (preparation for certification exam)
 - Phlebotomy (Career Studies Certificate)

2 Semesters

- Building Trades Technology
 - Air Conditioning & Refrigeration (HVAC): Commercial (Career Studies Certificate)
 - Building Trades Technology (Career Studies Certificate)
 - Construction Management (Career Studies Certificate)
 - Electrical Wiring (Career Studies Certificate)
 - Horticulture Technology (Career Studies Certificate)
- Business & Professional Services
 - Business Communications (Career Studies Certificate)
 - Hospitality Management (Career Studies Certificate)
- Engineering, Mathematics, Mechatronics, & Manufacturing
 - Computer Aided Design (Career Studies Certificate)
- Health Professions
 - Magnetic Resonance Imaging (MRI; Career Studies Certificate; available online)
 - Medical Billing Specialist (Career Studies Certificate)
- Information Technology
 - Cyber Security (Career Studies Certificate; available online)
 - CISCO™ CCNA™ Networking (Career Studies Certificate; available online)
 - Network & Security Administration (Career Studies Certificate; available online)
 - IT Support Analyst (Career Studies Certificate; available online)

Fully Online Programs

- Business & Professional Services
 - Business Administration (A.S. Degree)
 - Business: Legal Office Assisting (Career Studies Certificate)
- Health Professions
 - Healthcare: Computed Tomography (CT) Imaging (Career Studies Certificate)
 - Healthcare: Magnetic Resonance Imaging (Career Studies Certificate)

- Information Technology
 - Information Systems Technology (A.A.S. Degree)
 - Information Systems Technology: Cyber Security & Network Administration Specialization (A.A.S. Degree)
 - Information Systems Technology: Database & Program Developer Specialization (A.A.S. Degree)
 - IT: CISCO™ CCNA™ Networking (Career Studies Certificate)
 - IT: Cyber Security (Career Studies Certificate)
 - IT: Database & Program Developer (Career Studies Certificate)
 - IT: Information Technology Support Analyst (Career Studies Certificate)
 - IT: Network & Security Administration (Career Studies Certificate)
 - IT: Web Programmer (Career Studies Certificate)

Hybrid Programs and Courses

Hybrid programs consist of certificates and degrees that can be completed taking mostly online and a few face-to-face, on-campus courses.

- Online Classes (not enrolled in a specific program of study)
 - EGR 126: Computer Programming for Engineers
 - EGR 140: Engineering Mechanics—Statics
 - EGR 245: Engineering Mechanics—Dynamics
 - EGR 246: Mechanics of Materials
 - EGR 251: Basic Electric Circuits 1

Program Enrollment

VWCC's profile at SCHEV reports an overall fall headcount of 6,303 for the fall 2019 term. Enrollment at VWCC has fallen during the past 10 years from a fall enrollment count of 8,778 in fall 2010, representing a 28.2% decrease. Enrollment declines were steepest for students enrolled in certificate programs (–68.3%).³

The Virginia Governor's G3 ("Get Skilled, Get a Job, Give Back") initiative, announced in December 2019, will make community college tuition-free to low- and middle-income students pursuing jobs in high-demand fields. This initiative is anticipated to increase community college enrollment across the state.

A detailed view of enrollment by program is presented in the *Area of Study/Program and Enrollment* table below for the time period (April 1, 2018–April 17, 2020). The

³ <https://research.schev.edu/iprofile.asp?UID=233949>

Commercial Driver's License program (333) has the largest enrollment count of all programs, followed by Contractor's License (164) and Machining (113).

Area of Study/Program and Enrollment

Area of Study/Program	Enrollment
Automotive	4
Automotive On-Ramp	4
Building Trades	188
Contractor's License	164
Trades Renewal	24
Business & Leadership	37
Human Resources	16
Management and Accounting	9
Project Management	12
Health Professions	216
Dental	73
Medical Assistant	83
Medical Office & Billing	4
Nurse Aide	14
Pharmacy	42
Information Technology	13
Computer Support and Repair	10
Network and Security	3
Manufacturing	208
Industrial Maintenance	23
Machining	113
OSHA	24
Welding	48
Transportation	333
Commercial Driver's License	333
Grand Total	999

Advisors and Business Partners

VWCC has many business partners, including Carilion Clinic and Radford University, who are partners in offsite programs and share costs.

Student Support

VWCC has many supports for students, from advisors to career placement professionals. The mission of the Learning Resources group is to promote student success by offering the most effective resources for teaching and learning to students, faculty, and staff, through a comprehensive set of services—including testing, learning assistance/tutoring, library services, online learning, instructional design, and educational technology. Resources unique to VWCC include:

- **Brown Library** offers a one-stop location for a variety of student services, spaces to study, computers, printers, rooms that students may reserve for group work, and onsite staff.
- **Tutoring.** The Academic Link Resource Desk offers a variety of learning assistance services, including one-on-one/group tutoring; walk-in assistance in the STEM Center, the Writing & Research Help Center, and an open computer lab; online tutoring; and academic success coaching. These services are available to all VWCC students at no cost. The Academic Success/Smart Moves Infoguide provides resources to help students achieve academic success and to successfully transition from high school to college.
- **TRiO Student Support Services**, or TRiO Pathways, is an educational grant funded by VDOE. TRiO Pathways provides up to 250 VWCC students, who meet certain eligibility requirements including first generation college students, low socioeconomic status, or disability, additional support to achieve academic success. These supports include instructional support services, advising, and counseling.
- **Online Learning & Instructional Technology.** The mission of the Department of eLearning and Instructional Technology (eLIT) is to support and empower faculty, staff, and students in their use of instructional strategies and technologies that promote effective learning outcomes in online, hybrid, and technology-enhanced learning environments.

Site Visit Observations

Healthcare programs prepare students for careers in Dental Hygiene, Medical Laboratory Technology, Nursing (RN), the LPN to RN Bridge Program, Physical Therapist Assistant (Available Fall 2021), Radiation Oncology, and Radiography. These are restricted programs in that a student must qualify with a certain GPA, prerequisites, and references before they may enroll in the program. Nursing students may earn degree and transfer credit from LPN and to BSN in this program. Courses are listed in the *Healthcare Program and Courses* table.

Healthcare Program and Courses

Program	Courses
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Dental Hygiene	<p>Oral Anatomy Histology/Head and Neck Anatomy Management of Emergencies Oral Radiography for the Dental Hygienist Dental Hygiene I, II, III, IV, and V General and Oral Pathology Periodontics for Dental Hygienist Pharmacology Introductory Microbiology Nutrition Management of Dental Pain and Anxiety College Composition I Practical Materials for Dental Hygiene Public Health Dental Hygiene I and II Developmental Psychology Office Practices and Ethics Ethics</p>
Medical Laboratory Technology	<p>Human Anatomy & Physiology I and II Introductory Chemistry Statistical Reasoning Introduction to Medical Laboratory Technologies Immunology Clinical Hematology I and II Clinical Immunohematology/Immunology I and II Ethics Developmental Psychology Clinical Urinalysis Clinical Chemistry & Instrumentation I and II Parasitology and Virology Clinical Bacteriology Laboratory Instrumentation Cardiopulmonary Resuscitation</p>
Nursing (RN)	<p>Human Anatomy and Physiology Introduction to Nursing Concepts Competencies for Nursing Practice Professional Nursing Concepts Health Promotion and Assessment Introductory Microbiology Health Care Participant Health/Illness Concepts College Composition II Health Care Concepts I and II Advanced Professional Nursing Concepts Complex Health Care Concepts Nursing Capstone Ethics</p>
Physical Therapist Assistant	<p>College Composition Introduction to Medical Terminology Human Anatomy and Physiology II Introduction to Physical Therapist Assisting</p>

	<p>Musculoskeletal Structure and Function Developmental Psychology Ethics Medical Reporting Kinesiology for the Physical Therapist Assistant Therapeutic Procedures I and II Clinical Education Psychological Aspects of Therapy Therapeutic Exercise Pathological Conditions Clinical Practicum I and II Rehabilitation Procedures Professional Issues Seminar in Physical Therapy 2</p>
Radiation Oncology	<p>Cardiopulmonary Resuscitation Human Anatomy and Physiology II Introduction to Radiation Oncology Therapeutic Radiation Safety Patient Care in Oncology Pre-Clinical Techniques in Radiation Oncology College Composition I Radiation Oncology/Pathology I and II Clinical Clerkship I, II, III, and IV Quality Improvement Introduction to Cross-Sectional Anatomy Developmental Psychology Ethics Therapy Physics I and II Clinical Radiobiology Dosimetry Planning Professional Seminar</p>
Radiography	<p>Medical Terminology I Radiographic Procedures I, II Elementary Clinical Procedures I, II Fundamentals of Reasoning Radiologic Specialties Patient Care Procedures Ethics Cardiopulmonary Resuscitation Coordinated Internship Radiation Protection and Radiobiology College Composition I Radiologic Science I and II Advanced Clinical Procedures I and II Radiographic Pathology Principles of Psychology Correlated Radiographic Theory</p>

- **Observations:**

- Most of the classroom activity is at the main campus. In addition, the old community hospital is used, with partners from Carilion Health Systems and Radford University providing training in a typical medical setting. A new surgical technician program will be a joint project with Radford University located in the old hospital.
- In Dental Hygiene, students participate in a simulated dentist’s office, with well organized and clearly labeled workspaces and safety messages. Students work with walk-in patients who need or want dental preventive care, such as teeth cleaning, saving the community some \$300,000 per year in free dental care. Students use an electronic medical record system to record patient information and to converse with their instructor. The program has local industry support and placement.
- Students may study to become CNAs in the fast-track program (under Career/Corporate programs).
- The biotech program trains medical lab assistants, and with transferable credit, a student may go on to prepare for a bachelor’s degree in medical technology. VWCC starts with “bench skills” or microscope and basic lab processes, then adds Chemistry, Microbiology, additional bench skill building, and the final capstone/ internship working in a lab. This is a high-demand occupation.
- The Nursing lab had patient rooms with computerized patients that can simulate emesis, blood, and birthing babies. The instructor can watch patient care in a separate room through a one-way mirrored glass.
- The radiography lab had radiation-free simulators that appear to be exactly what is used in medical providers’ labs. Students use this equipment to model all skills required to earn MRI certifications.
- The medical technology lab is set up like a hospital lab, where blood is analyzed, genes are modified, and lab tests are conducted, offering a real-life setting for learning.

Medical Business program offerings include AMT: Medical Administrative Management, Health Records Coding, Medical Office Specialist, Medical Office Specialist-Advanced, and Medical Billing. The business programs are designed around ACBSP Business Programs Accreditation; the ACBSP is a leading specialized accreditation association for business education. Medical programs and courses are listed in the table below.

Medical Programs and Courses

Program	Courses
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Medical Administrative Management	<p>Orientation to Business and Professional Services College Composition I Keyboarding I Medical Terminology I and II Introduction to Medical Practice Management Legal Aspects of Health Record Documentation Office Administration I and II Business Communications Word Processing I Keyboarding for Speed and Accuracy Health Records Coding Editing/Proofreading Skills Introduction to Desktop Information Management Computerized Accounting Word Processing Advanced Operations * Business Mathematics Advanced Coding and Reimbursement Microcomputer Office Applications * Principles of Public Speaking</p>
Health Records Coding	<p>Keyboarding I Legal Aspects of Health Record Documentation Medical Terminology I and II Business Communications Office Administration I Anatomy & Physiology for Administrative Health Professionals Health Records Coding Advanced Coding and Reimbursement</p>
Medical Office Specialist	<p>Orientation to Business and Professional Services College Composition I Keyboarding I Introduction to Medical Practice Management Legal Aspects of Health Record Documentation Medical Terminology I and II Word Processing I Health Records Coding Advanced Coding and Reimbursement</p>
Medical Office Specialist - Advanced	<p>Word Processing I Keyboarding for Speed and Accuracy Business Communications Office Administration I Editing/Proofreading Skills Introduction to Desktop Information Management Computerized Accounting Word Processing Advanced Operations</p>
Medical Billing	<p>Keyboarding I Office Record Keeping Business Communications Managing Electronic Billing in a Medical Practice Medical Terminology I and II</p>

	Word Processing I Legal Aspects of Health Record Documentation Health Records Coding
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- **Observations:** Students learn Microsoft Office applications, earn certificates (Word, Excel, etc.), and—on the medical side—learn medical insurance coding, such as ICD-10 and medical records administration.

The **Maintenance Technology** program is a career studies certificate program with residential and commercial tracks that prepare students for careers in HVAC installation, service, and sales. Maintenance technology courses are listed below.

Maintenance Technology Program Courses

Program	Courses
Maintenance Technology Career Studies Program (Certificate)	Air Conditioning and Refrigeration I and II Practical Electricity I Blueprint Reading and the Building Code Advanced Troubleshooting and Service Applied Hydraulics and Pneumatics

- **Observations:**
 - The program has strong local partners. One employer reportedly paid tuition and costs if the student went to work for them; they also supported additional training and college degree programs for employees.
 - This program is also dually enrolled, with some high school students paying tuition and taking courses on campus.
 - The HVAC program is geared toward principles, estimation, and supervision. The courses teach systems already in place and topics such as duct calculations and sizing. CAD systems and troubleshooting are covered along with analog and digital HVAC systems. No sheet metal is done in the course; the intention is to create an HVAC maintenance worker and not a fabricator.
 - Commercial refrigeration is offered in the industrial park as a separate program, and Trane Corporation provided equipment for these courses.
 - The instructor is a proctor for Mainstream Engineering and is the main provider of certifications for the program as well as a business partner who makes an effort to hire graduates.
 - The instructor mentioned certifications and focused on EPA 608, which is a basic certification required of any HVAC technician.

Mechatronics programs lead to an Associate of Applied Science degree and Career Studies certificates and are described as a “launching pad for meaningful technology employment,” providing hands-on instruction in mechanical, electrical, and computer systems. The program starts with Mechatronics Fundamentals and industry practices. Then students have 2 semesters (Levels 1 & 2) of career studies coursework followed by a full year of academics for the Associate degree. Students can earn the Siemens

certification for NC3 and other certifications in sensors and robotics. Mechatronics courses are listed below.

Mechatronics Program Courses

Program	Courses
Mechatronics Systems Engineering Technology	Orientation to Engineering and Mathematics Basic Technical Mathematics Materials and Processes of Industry DC and AC Fundamentals I Industrial Safety Technical Drafting I Applied Hydraulics and Pneumatics Industrial Electronics I and II Technical Mathematics Computer Methods in Engineering and Technology Parametric Solid Modeling I Introduction to Basic Computer Integrated Manufacturing College Composition I Mechanics I and II General College Physics I Applied Quality Control Automated Manufacturing Systems I Principles and Applications of Robotics

- **Observations:**

- The mechatronics classroom is an agile setup: machines, tables, and chairs may be moved around easily to adjust the classroom for projects at hand. The mechatronics and Programmable Logic Controller or PLC systems are Festo equipment, which is extensive and impressive, along with other trainers covering electrical, pneumatics, and other systems.
- The FabLab is brand new and contains several pieces of equipment designed as a makerspace and inventor resources that can be employed for the creation of products. The college has partnership agreements and charges for the use of the lab. Anyone from inside or outside the school may use the lab, with no age restriction. Participants and users must pass training on using equipment safely.
- Like other VWCC programs, there are strong partnerships with business. One company mentioned needing cable testing equipment, and VWCC purchased the equipment, connecting the company to the mechatronics program and building an employment pathway for students.

Other Programs:

The WVCC team discussed other programs, including Agriculture, Automobile Technology, Construction, Diesel, Truckdriver, and Welding. The agriculture program is in development and is considered an academic degree program; the team noted that welding will be a requirement. Auto Tech is an ASE curriculum. The Diesel program is also in development, with heavy equipment operator training that will use simulators to train workers.

The SEG team did not tour workforce programs and trades.

Other Information/General Observations:**Career Pathways:**

Space: It is evident that the college has ample capacity to support a variety of career pathways, especially with the recently commissioned building(s). The SEG team noticed many rooms and offices that were closed in the STEM building and few students present. This could have been due to a gap in scheduling or an indicator of additional capacity.

Industry Involvement: Staff reported that industry involvement is widespread and effective; this was strongly evident in the nursing and dental hygiene programs. The SEG team was unable to explore the extent of the involvement, especially in the areas of learning design, delivery, and evaluation of curricula. No evidence was obtained that indicated employers were supportive of national credentials indicating a potential employee's performance capabilities. NCCER was mentioned during the observation of HVAC, as was AWS for Welding and NC3 for electrician training.

Career Pathways/Credentials: There was little information shared about program pathways between high schools and VWCC except for dual enrollment. This might have been the result of an extended tour rather than an in-depth discussion.