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High Quality Career and Technical Education: Implications for Nevada

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Within the next decade nearly half of the employment opportunities in Nevada are projected to be categorized as "middle-skill" jobs, positions that require more education and training than a high school diploma but less than a four-year college degree. Despite open positions, unemployment and underemployment will persist if these middle-skill workers cannot be cultivated in sufficient numbers. Career readiness is generally assessed on three categories: academic knowledge, technical skills, and employability skills. While the first two categories are self-explanatory, the other two warrant a brief explanation. Employability skills refer to the suite of abilities seen as critical to success by employers; examples include critical thinking, adaptability, collaboration, responsibility and communications. Career and Technical Education (CTE), which in the past was alluded to as "vocational training," is designed to address the second and third facets of career readiness.

Nevada Facts & Statistics

- CTE programs in Nevada are organized into 15 career clusters and 75 distinct pathways.
- Within CTE-focused high schools, graduation rates (84 percent) were significantly higher than the overall high school graduation rate average.
- 91 percent of CTE high school graduates met performance goals for reading/language arts, while 89 percent met mathematics goals.
- 97 percent of CTE postsecondary students proceeded to the workforce, military or an apprenticeship.
- Projected demand in Nevada for middle-skill jobs through 2020 is equal to demand for high- and low-skilled employees combined.

U.S. Facts & Statistics

- Apprenticeship is widely considered the oldest form of CTE in the United States, dating from colonial times.
- The first dedicated vocational school opened in 1823, immediately sparking broad acceptance of the adoption of this educational model.
- A 2006 federal act authorized federal funding for CTE nationally; however, the allocation formula does not favor Nevada, which receives among the lowest annual allocations.
- The 2006 legislation was reauthorized in 2016 as the Strengthening Career and Technical Education for the 21st Century Act.

Recent Actions in Nevada

- Allocations from the federal fund for FY 2017 are overseen by the Nevada Department of Education, Office of Career Readiness, Adult Learning & Education Options.
- As of academic year 2013-14, Nevada had 55,076 participants in secondary CTE programs and another 27,265 in postsecondary CTE programs. For context, California has a combined 1.9 million participants in its secondary/postsecondary CTE programs.
- In 2016, the Nevada State Board of Education approved the Nevada CTE Quality Program Standards, establishing specific responsibilities for students, teachers, counselors and administrators for maintaining effective CTE programs.

Considerations for Future Actions

CTE programs have proven highly effective, both in terms of creating career-ready individuals and supporting the state's goal of improving high school graduation rates. To build upon this success and address the current and widening middle-skill jobs gap, leadership is encouraged to explore a number of measures, including:

- Ensure the availability of adequate funding for CTE programs at both the secondary and postsecondary levels.
- Invest in the expansion of existing CTE programs based upon projected areas of demand.
- Increase emphasis on digital literacy skills within CTE programs.
- Develop assessments to measure career and college readiness before 12th grade.
- Create comprehensive CTE work-based learning methods based on successful models.

- Implement outreach programs that cultivate interest in CTE programs within Nevada middle schools.

Statewide Benefits of Future Action

- An increased pool of credentialed, mid-skill workers will close the existing middle-skill jobs gap, creating more and better-paying jobs for Nevada residents, developing our workforce and strengthening our economy.
- CTE is associated with higher graduation and employment rates, reducing dependence upon government assistance programs.
- Developing certified, qualified professionals with both technical and employability skills will position Nevada as an attractive locale for business investment.

Implications of Maintaining Status Quo

- Given the significantly higher graduation rates among high school students in secondary CTE programs, failure to expand the use of this model will inhibit overall progress in terms of overall graduation rates.
- The fields with the greatest CTE participation are technology & communications, health science, and hospitality & tourism. To the extent that enrollment in these programs does not increase to match increased business demand for professionals in these fields, a persistent skills gap is likely to remain and impair economic growth.
- The impending retirement of baby boomers, coupled with technological innovation, is expected to widen the middle-skill jobs gap; a lack of employees in relevant technical positions puts Nevada at a severe economic disadvantage.

Introduction

Academic preparation for college alone does not lead to students' career readiness. The means recommended for preparing college-ready graduates, such as the Common Core State Standards (CCSS), rigorous courses, and selected tests aligned with those standards, fail to accommodate the varied nature of workplace and the different kinds of preparation required for successful transition into today's workforce (Stone & Lewis, 2012). To differentiate from the "college readiness" that our systems had primarily focused on, the Association for Career and Technical Education (ACTE) defined the term "What Is Career Ready" in 2010, which has triggered nationwide discussions about college and career readiness. To be career ready, a graduate must have mastery of three major skill areas: academic knowledge, employability skills, and technical skills. Academic knowledge is essential to all functioning in today's world, especially the occupational expression of academic knowledge (Stone & Lewis, 2012). Employability skills are seen as the most critical to workplace success by employers and include critical thinking, adaptability, problem solving, oral and written communications, collaboration and teamwork, creativity, responsibility, professionalism, ethics, and technology use. Technical skills are unique to specific occupational areas.

Career and technical education (CTE) plays a unique and value-added role in preparing students to master these skills and smoothly transit to adulthood and workforce. Research has shown that participation in CTE can effectively reduce high school drop-out rates by providing alternative delivery methods to increase students' engagement and build student-adult relationships, especially for at-risk students (Association of Career and Technical Education, 2007). Career and Technical Student Organizations (CTSOs), as one core component of quality CTE programs, engage students in co-curricular activities, develops employability skills, and increases college aspirations and career self-efficacy (Alfeld et al., 2007).

The National Association of State Directors of Career Technical Education Consortium (NASDCTEc) has developed Common Career Technical Core (CCTC) standards for each of the 16 Career Clusters and their corresponding Career Pathways that define the knowledge and skills that should be mastered when students complete a program of study (https://www.careertech.org/CCTC). The CCTC standards also define career ready practices that apply to all programs of study, addressing the knowledge, skills and dispositions to become career ready. Some states raise the rigor of obtaining a high school diploma by requiring a CTE industry credential, licensure, or competency assessment.

Historical Context of CTE

CTE was previously known as vocational education. Apprenticeship is probably the oldest form of vocational education in the United States, starting from colonial America (Gordon, 2014). Apprenticeship provided basic elements such as: food, clothing, and shelter; religious instruction; general education as needed in the trade; skill training; and the "mysteries" of the trade. Apprenticeship at the time involved job training aligned with the needs of the society and provided an option for those who could not afford an education.

In the early 19th century, the American lyceum movement began, which contributed significantly to American adult education. In 1823, the first vocational trade school, Gardiner Lyceum, opened in Maine. In 1824, a second school of this type, the Rennselaer School in Troy, New York was opened, providing teachers of science with the chances to apply scientific principles at farms and production-oriented workshops (Gordon, 2014).
More schools were founded with increasing interest in agricultural and industrial education up to the middle of the 19th century. A political movement led by Professor Jonathan Baldwin Turner from Illinois College advocated the creation of agriculture colleges and the use of land-grants to fund a system of industrial colleges in every state, which later became the Morrill Act, signed into law by President Abraham Lincoln in 1862.

The first manual training school in St. Louis, Missouri was founded in 1879, which set the foundation for modern career and technical education. The 1917 Smith-Hughes Act provided the first federal funding for vocational education. After World War I, career and technical education received wide acceptance by the public and expanded to include adult education and training for re-entering the workforce. A surge in career and technical education during World War II occurred as technical skills were needed for defense purposes.

Career and technical education itself has evolved over the years. A 1990 federal law defined vocational education as preparation for "occupations requiring other than a baccalaureate or advanced degree." Today, career and technical education should not be restricted to those occupations, but rather provide hands-on learning opportunities collaborating with non-vocational educators to prepare for both career and further education.

CTE Funding

The Carl D. Perkins Career and Technical Education Act of 2006 (Perkins IV) authorizes federal funding for CTE and provides formulas for distributing those funds at the secondary and postsecondary levels. At the secondary level, allocations to local educational agencies (LEAs) are based on the number of youth ages 5-17 who reside within an LEA's boundaries and who live in poverty. At the postsecondary level, funds are distributed proportionately to institutions of higher education (IHEs) based on the number of students who receive Pell Grants or aid from the Bureau of Indian Affairs. In addition to federal funding, all states provide funds to support the delivery of education at the secondary and postsecondary levels, some of which are earmarked for the provision of CTE instruction. Many local CTE programs also generate their own funds in forms of monetary contributions, gifts of equipment and supplies, or in-kind donations from business, industry, and labor representatives. Table 1 shows the Perkins IV state allocations in fiscal years 2013-2015.

Table 1: *Perkins Basic State Grant – State Estimated Allocations*

STATE/ TERR.	FY 2013	FY 2014	FY 2015
Alabama	19,175,065	19,175,065	19,175,065
Alaska	4,214,921	4,214,921	4,214,921
Arizona	22,459,217	24,934,607	24,934,607
Arkansas	11,403,795	11,403,795	11,403,795
California	113,295,476	122,943,598	122,943,598
Colorado	14,273,168	15,944,320	15,944,320
Connecticut	8,596,623	9,466,507	9,466,507
Delaware	4,494,945	4,720,975	4,720,975
D.C.	4,214,921	4,214,921	4,214,921
Florida	56,063,464	61,726,876	61,726,876
Georgia	34,407,329	38,240,445	38,240,445
Hawaii	5,235,475	5,496,906	5,496,906
Idaho	5,999,521	6,376,981	6,376,981
Illinois	38,934,174	40,519,069	40,519,069
Indiana	23,687,919	24,843,250	24,843,250
Iowa	11,963,946	11,963,946	11,963,946
Kansas	10,245,408	10,245,408	10,245,408
Kentucky	17,905,647	17,905,647	17,905,647
Louisiana	21,041,943	21,041,943	21,041,943

Maine	5,235,475	5,496,906	5,496,906
Maryland	14,812,307	15,289,772	15,289,772
Massachusetts	17,323,922	17,766,415	17,766,415
Michigan	35,015,474	37,280,167	37,280,167
Minnesota	16,684,637	16,684,637	16,684,637
Mississippi	13,363,550	13,363,550	13,363,550
Missouri	20,939,820	21,433,742	21,433,742
Montana	4,939,307	5,179,103	5,179,103
Nebraska	6,816,893	6,816,893	6,816,893
Nevada	8,633,133	9,650,599	9,650,599
New Hampshire	5,235,475	5,496,906	5,496,906
New Jersey	21,030,188	22,370,715	22,370,715
New Mexico	8,017,422	8,028,679	8,028,679
New York	51,361,536	51,368,505	51,368,505
North Carolina	32,524,684	35,695,795	35,695,795
North Dakota	4,214,921	4,214,921	4,214,921
Ohio	42,750,001	42,750,001	42,750,001
Oklahoma	15,094,180	15,094,180	15,094,180
Oregon	12,410,066	13,448,245	13,448,245
Pennsylvania	40,722,778	40,722,778	40,722,778
Rhode Island	5,235,475	5,496,906	5,496,906
South Carolina	16,827,895	18,310,739	18,310,739
South Dakota	4,214,921	4,214,921	4,214,921
Tennessee	21,457,158	23,042,024	23,042,024
Texas	84,168,234	92,014,058	92,014,058
Utah	11,495,239	12,274,340	12,274,340
Vermont	4,214,921	4,214,921	4,214,921
Virginia	23,247,014	23,634,248	23,634,248
Washington	19,584,244	20,736,066	20,736,066
West Virginia	8,428,617	8,428,617	8,428,617
Wisconsin	20,241,685	20,241,685	20,241,685
Wyoming	4,214,921	4,214,921	4,214,921
American Samoa	318,633	334,544	334,544
Guam	00,852	630,855	630,855
Northern Mariana Islands	318,633	334,544	334,544
Puerto Rico	18,458,484	18,458,484	18,458,484
Virgin Islands	567,534	567,534	567,534
Freely Associated States	145,661	152,934	152,934
Indian set-aside	13,305,569	13,969,975	13,969,975
Undistributed (non-State allocations)	2,661,114	2,793,995	2,793,995
Total	1.064 B	1.118 B	1.118 B

Note: *FY = fiscal year; amount in U.S. dollars*
Source: *U.S. Department of Education, Fiscal Years 2013-2015 State Tables*

State Approaches to Funding CTE programs

The U.S. Department of Education, Office of Career, Technical, and Adult Education (2014) released a report that described various approaches through which states funded CTE in the 2011-2012 academic year. The report showed that states' strategies to financing CTE fell into three categories:

- Foundational funding only – general state funding that provide no earmark for CTE (local administrators must decide how funds should be distributed).
- Funding for area CTE centers – dedicated funds for area CTE centers that deliver CTE services to part-time students (do not include comprehensive high schools or community or technical colleges).
- Categorical funding – dedicated funding exclusive for CTE programs distributed to LEAs and IHEs to support career-related instructional services. These approaches include student-based, cost-based, and/or unit-based formulas.

At the secondary level, the report indicated that majority of states (37 states) earmarked categorical funds for CTE in AY 2011-2012, eight states only relied on foundational funding for CTE, and seven states depended on foundational funding for CTE and allocated dedicated funding just to area CTE centers. At the postsecondary level, the majority (30 states) of the 37 states with available information relied on foundational funding only to support

CTE at IHEs in AY 2011-2012, five states provided categorical funding for CTE, and two states directed some categorical funds to area CTE centers. It is noteworthy that the absence of categorical funding for CTE at the postsecondary level simply means that CTE funding is not differentiated from the state's basic aid for community and technical colleges.

Some states adopt a performance-based funding (PBF) approach to facilitating allocations dependent on student or program performance. Fiscal awards are given to providers that meet state-established benchmarks or targets. At the secondary level, Texas and South Carolina reported using PBF to allocate federal Perkins IV funds, while five states (Arizona, Florida, Kansas, Missouri, and West Virginia) used PBF to allocate state CTE funds. Among those seven states, some states condition funding for CTE programs based on LEA performance, while others based funding on indicators such as placement of CTE students into postsecondary education or employment, attainment of industry-recognized credentials, or CTE completion rates. At the postsecondary level, no state reported using PBF to allocate Perkins IV funds, while four states (Arkansas, Georgia, Minnesota, and North Dakota) used PBF to allocate state funds. Some states conditioned funds allocations based on the performance of the entire community or technical college system rather than specific CTE outcomes. Indicators to distribute postsecondary funds include graduation rates, credential, and/or degree attainment.

Carl D. Perkins Reauthorization and Nevada Fiscal Year 2017 Grant Process

On July 7, 2016, the House Education and the Workforce Committee voted unanimously and approved a Perkins reauthorization bill, the Strengthening Career and Technical Education for the 21st Century Act (H.R. 5587), sponsored by Reps. Glenn Thompson (R-PA), co-chair of the House CTE Caucus, and Katherine Clark (D-MA), marking the first comprehensive reauthorization of Perkins to be considered by Congress in a decade. On the same day, the House Labor, Health and Human Services, and Education Appropriations Subcommittee approved a fiscal year 2017 education funding bill, including the Perkins Basic State Grant at $1.118 billion and Perkins National Programs at $7.4 million.

The Nevada Department of Education, Office of Career Readiness, Adult Learning & Education Options recently released Perkins IV allocations for fiscal year 2017. Table 2 summarizes the distribution of funds and receivers.

Table 2. *Carl D. Perkins State of Nevada Allocations for Fiscal Year 2017*

Categories	
Basic Grant - Secondary Education	**5,140,883.01**
Carson City School District	100,399.61
Churchill County School District	37,786.39
Clark County School District	3,925,359.50
Douglas County School District	55,747.60
Elko County School District	86,684.09
Eureka County School District	1,774.02
Humboldt County School District	28,121.73
Lander County School District	9,508.07
Lincoln County School District	8,610.85
Lyon County School District	88,305.30
Mineral County School District	8,545.22
Nye County School District	73,592.52
Pershing County School District	9,534.18
Storey County School District	0
Washoe County School District	693,294.53
White Pine County School District	13,619.41
Basic Grant - Postsecondary Ed.	**2,419,239.06**
College of Southern Nevada	1,446,360.36
Great Basin College	168,099.99
Truckee Meadows Community College	575,042.06
Western Nevada College	229,736.66
Corrections Grant Allocations	**98,279.13**
C.O. Bastian High School	24,569.78
Jacobsen High School	24,569.78
Nevada Youth Training Center	24,569.78
Spring Mountain Youth Camp	24,569.78
Basic Grant Reserve Allocations	**793,603.97**
Tech Prep Reserve Funds	500,000
Competitive Reserve Funds	293,603.97
Nontraditional Grant Allocations	**37,792.92**
Nontraditional Employment/Training Grant	37,792.92

Note: *Amount in U.S. dollars; allocations to local agencies are contingent on State receipt of the full federal award. Source: Nevada Department of Education, Fiscal Year 2017 Perkins Allocations, last updated 4/4/2016.*

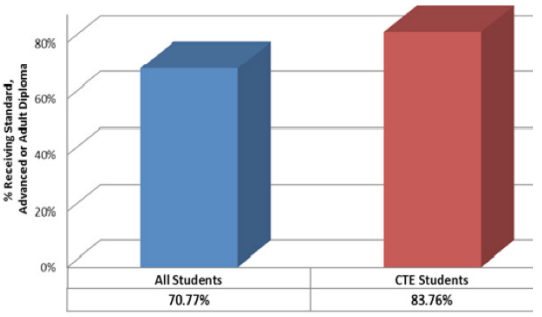
CTE Course Taking Patterns and Clusters

According to students' CTE course-taking patterns, students are categorized as CTE participants or concentrators. At the secondary level, a CTE participant is a student who has earned one (1) or more credits in any CTE course, whereas a CTE concentrator has earned two (2) or more credits in a single CTE program area. At the postsecondary level, a CTE participant is a postsecondary adult student who has earned one (1) or more credits in any CTE program area, whereas a CTE concentrator is an adult student who: (a) completes at least 12 academic and/or CTE credits within a single program area sequence that terminates in the award of an industry-recognized credential, a certificate, or degree; or (b) completes a short-term CTE program sequence of fewer than 12 credit units that terminates in an industry-recognized credential, a certificate, or a degree.

Both high school and college CTE career pathways are organized into 16 distinct career clusters. The 16 career clusters are: Agriculture, Food & Natural Resources; Architecture & Construction; Arts, A/V Technology & Communications; Business Management & Administration; Education & Training; Finance; Government & Public Administration; Health Science; Hospitality & Tourism; Human Services; Information Technology; Law, Public Safety & Security; Manufacturing; Marketing Sales & Services; Science, Technology, Engineering & Math; and Transportation, Distribution & Logistics.

Student engagement in career pathways can lead to higher graduation rates. For example, among the class of 2015 in Nevada, the high school graduation rate for CTE students (concentrators) is 13 percent higher than the overall graduation rate of 70.8 percent for all Nevada high school students. This trend has been consistent over the last three years, with an average of 12 percent higher graduation rates for CTE concentrators.

Figure 1. *Nevada high school class of 2015 cohort graduation rate for All vs. CTE students*



Source: *Nevada Report Card State Level Total Adjusted Cohort Graduation Rate 2014-2015 Overview of CTE Enrollment Data and Student Performance in Western States*

According to data from the U.S. Department of Education for the 2013-2014 academic year (updated 10/31/15), Tables 3 ranked CTE participants at the secondary and postsecondary level in 13 Western states: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

Table 3. *Rankings of CTE Participants in Western States for Academic Year 2013-2014*

	Secondary		Postsecondary	
Rank	State	Participants	State	Participants
1	CA	970,235	CA	942,427
2	WA	305,383	WA	176,248
3	UT	102,758	AZ	123,515
4	CO	96,037	OR	65,827
5	AZ	94,269	UT	65,000
6	ID	83,026	NM	53,890
7	NM	58,594	CO	51,182
8	NV	55,076	NV	27,265
9	OR	46,642	MT	14,169
10	HI	27,017	WY	13,555
11	AK	13,418	HI	9,714
12	MT	10,467	ID	7,053
13	WY	8,653	AK	7,006

Table 4a. *Secondary CTE Concentrators in 13 Western States for Academic Year 2013-2014 by Career Cluster (C.C.)*

C.C.	CA	WA	ID	CO	UT	NV	AZ	OR	NM	MT	HI	WY	AK
Agri.	42,113	1,352	12,818	4,153	1,357	1,211	1,131	2,362	296	645	325	812	72
Arch.	28,120	3,347	2,344	5,320	461	1,576	1,152	1,092	1,043	1,026	392	690	277
Arts	110,359	34,133	5,322	10,788	1,165	3,859	1,992	1,844	2,649	103	1,149	272	97
Bus.	60,584	254	24,741	25,722	1,698	803	1,692	1,607	195	655	163	164	208
Edu.	5,358	14,058	2,596	439	2,406	534	1,243	1,519	37		55		27
Fin.	1,609	2,868			322	163	112	541	6	384	92	117	
Gov.		4,475							351				
Heal.	53,952	10,500	5,587	1,880	3,957	2,927	3,083	1,459	322	157	780	299	262
Hos.	26,548	6,168	8,130	7,337	912	1,953	3,030	1,817	1,499	486	640	455	101
H.S.	21,937	2,651	4,410	1,255	2,068	311	483	311	592	291		219	98
I.T.	13,907	19,351	2,315	3,664	1,188	800	747	414	197	144	31	115	30
Law	15,546	2,256	471	673	836	628	938	191	3		4		12
Man.	26,388	7,106	1,142	5,077	1,959	797	706	2,670	76	1,087	23	433	250
Mkt.	13,039	5,831	4,010	7,135	797	1,786	1,363	1,667	579	9	90	119	1
SciT.	13,735	1,725	5,820	6,505	531	554	648	809	699		231	173	20
Tran.	23,956	5,924	3,320	2,446	1,238	1,913	1,355	1,177	369		390	312	237
Total	**457,151**	**121,999**	**83,026**	**82,394**	**20,895**	**19,815**	**19,675**	**19,480**	**8,913**	**4,987**	**4,365**	**4,180**	**1,692**

Table 4b. *Postsecondary CTE Concentrators in 13 Western States for Academic Year 2013-2014 by Career Cluster (C.C.)*

C.C.	CA	WA	AZ	UT	CO	NM	OR	NV	MT	HI	ID	WY	AK
Agri.	7,009	1,573	440	437	1,028	169	480	138	205	338	223	289	14
Arch.	16,373	4,857	2,022	1,926	3,166	1,143	920	1,234	634	427	247	82	128
Arts	17,337	1,317	2,941	1,942	1,121	641	791	1,114	145	201	64	190	10
Bus.	39,069	10,239	6,281	3,529	2,221	2,217	2,094	1,325	1,105	687	769	563	317
Edu.	5,800	3,342	2,328	1,491	975	2,781	1,105	1,178	4,346	230	12	128	67
Fin.	585	422	28	2,017	13	421	1	1,478		462	220	86	
Gov.	46		63		401	42	17	6				17	
Heal.	35,656	18,077	10,842	5,260	8,541	6,470	2,469	2,249	3,152	1,083	1,543	2,216	1,008
Hos.	5,804	2,323	1,067	726	931	285	1,175	1,365	97	1,144	287	94	74
H.S.	36,509	4,085	1,953	297	1,249	1,430	1,058	19	86	153	317	56	70
I.T.	13,230	5,438	4,700	3,523	1,501	1,723	1,007	735	514	461	584	165	61
Law	37,051	2,992	6,518	2,585	1,761	2,311	1,497	1,258	219	585	491	225	104
Man.	10,350	8,028	1,500	1,540	2,040	2,239	1,236	727	593	351	485	666	380
Mkt.	5,059	734	159	2,246	195	201	168	37	85	101	260	2	100
SciT.	1,975	388	405	993	42	1,228	177	53	585	97	504	48	1
Tran.	12,146	3,653	2,049	3,347	1,874	1,784	1,190	553	391	598	875	326	166
Total	**243,999**	**67,468**	**43,296**	**31,859**	**27,059**	**25,085**	**15,385**	**13,469**	**12,157**	**6,918**	**6,881**	**5,153**	**2,500**

Tables 4a and 4b display distributions of CTE concentrators in 16 career clusters among 13 Western states, ordered from the state with the largest number of concentrators to the state with the smallest number of concentrators at the secondary and the postsecondary level, respectively. Some states (e.g., CA, WA, CO, ID, NV, and AK) had more CTE participants and concentrators at the secondary level than at the postsecondary level, except New Mexico and Hawaii, which had more CTE participants but fewer CTE concentrators at the secondary level than at the postsecondary level. Other states (e.g., UT, AZ, MT, and WY) had more CTE participants and concentrators at the postsecondary level, while Oregon had more CTE participants but fewer CTE concentrators at the postsecondary level than at the secondary level.

Secondary and Postsecondary Profiles of CTE Participation in Nevada

For academic year 2014-2015, the largest CTE concentrator enrollment in Nevada at the secondary level was in Arts, A/V Technology & Communications (19.1 percent), followed by Health Science (13.8 percent), and Hospitality and Tourism (12.8 percent). At the college level, the largest CTE concentrator enrollment occurred in Health Science (18.2 percent), followed by Hospitality and Tourism (11.0 percent), and Finance (10.8 percent).

In Nevada, secondary level CTE is available through comprehensive high schools and career and technical academies (CTA). CTAs are comprehensive high schools that integrate core academic subjects with specific career training in selected career clusters. Postsecondary level CTE in Nevada is delivered through four community colleges. The Association for Career and Technical Education reported the following 2013-2014 student performance data of CTE students in Nevada:

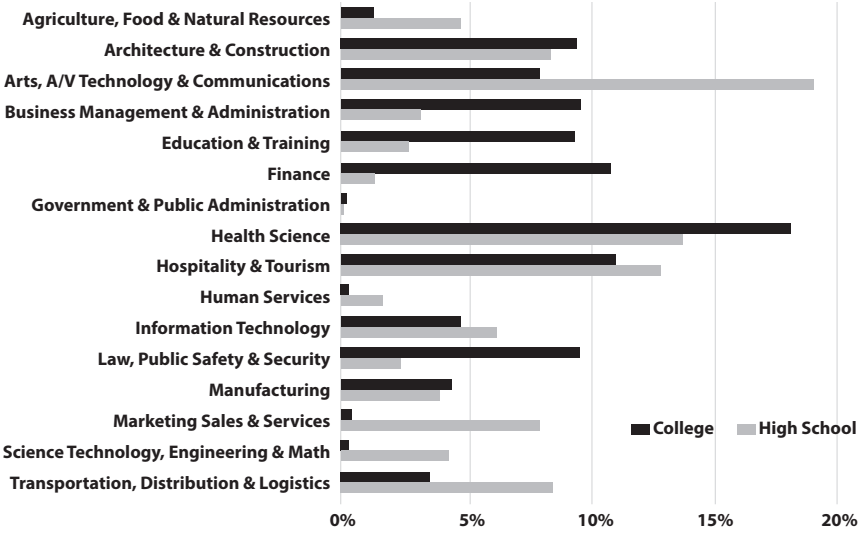
- 84 percent of CTE high school students graduated
- 91 percent met performance goals for reading/ language arts, and 89 percent met performance goals for mathematics
- 97 percent of CTE postsecondary students went on to the workforce, the military or an apprenticeship.

Note: Nevada students take end-of course exams in math and English language arts classes. High school juniors in Nevada must take the ACT College and career readiness exam to graduate, according to the Nevada Department of Education.

The 2016 U.S. News Best High Schools ranking in Nevada included the following three technical academies:

- Advanced Technologies Academy (ranked No. 3)
- West Career and Technical Academy (ranked No.4)
- Veterans Tribute Career Technical Academy (ranked No. 8)

Figure 2. *College vs. high school CTE concentrator enrollment by career cluster.*



Business and Industry/CTE Licensure Requirements for Nevada

Business and Industry (Grade 7-Adult)

For Business and Industry licensure, a person must have at least a high school diploma or its equivalent and hold a valid license issued by the appropriate Nevada licensing board, as applicable (Nevada Department of Education, n.d.). In addition, five years of employment related to the endorsement area are required. Three of the five years may be met by completion of relative coursework or training in career and technical education. Each of the following will be considered equivalent to one year of full-time employment:

- 16 semester credits from an accredited or licensed postsecondary institution
- 250 hours of training from an accredited or licensed postsecondary institution
- 2,000 hours of part-time employment
- 1,000 hours of pre-planned employment (i.e. apprenticeship or on-the job training)

For Business and Industry license first-time renewal, a person must provide proof of credit for 12 semester hours of coursework from an accredited postsecondary institution, including:

- Three semester hours in professional career and technical education courses;
- Three semester hours in a course involving career and technical education teaching methodology;
- Three semester hours in a course on applied or work-based learning; and
- Three semester hours in a course on pupil organization and management in career and technical education.

At least three semester hours of the required 12 hours must be earned within the first year of licensure. A list of approved courses can be found at the Nevada Department of Education website.

Secondary CTE (Grade 7-12)

To obtain a secondary CTE (grade 7-12) license, a person must pass the required testing (or equivalent in another state): Praxis Core Academic Skills for Educators, Principles of Learning and Teaching 7-12, and Praxis Content Area Test (if required for your desired area of licensure).

That person must also have at least a bachelor's degree from an accredited college/university and complete relative coursework in career and technical education and specific coursework requirements for the desired area(s) of endorsement. The following comprehensive major and minor areas of endorsement may be added to a secondary CTE license:

- CTE Agricultural Education
- CTE Automotive Technology
- CTE Business Education
- CTE Child Care
- CTE Communications and Media
- CTE Construction Technology
- CTE Drafting and Design
- CTE Electronic Technology
- CTE Family and Consumer Science
- CTE Food Service
- CTE Health Occupations
- CTE Human Services
- CTE Industrial Arts
- CTE Manufacturing Technologies
- CTE Marketing Education
- CTE Technology Education

Career and Technical Education Standards

The National Board for Professional Teaching Standards (NBPTS) aims to advance the quality of teaching and learning and strengthens the pipeline of CTE teacher preparation (National Board for Professional Teaching Standards, n.d.). The NBPTS has been recognized as the "gold standard" in teacher certification. The essence of the NBPTS' vision of accomplished teaching is captured in their five core propositions:

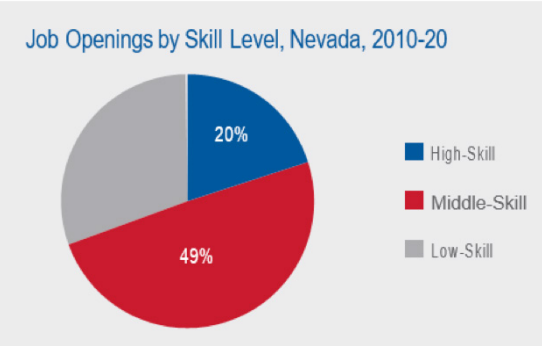
1. Teachers are committed to students and their learning.
2. Teachers know the subjects they teach and how to teach those subjects to students.
3. Teachers are responsible for managing and monitoring student learning.
4. Teachers think systematically about their practice and learn from experience.
5. Teachers are members of learning communities.

Role of CTE in Reducing the 'Skills Gap' and Engaging Millennials

Education today faces various challenges. Concerns about a lack of qualified employees in the U.S. workforce have exploded in recent years. On one hand, millions of aspiring workers remain unemployed and some report being underemployed; on the other hand, employers across industries find

it difficult to fill open positions. The phrase "skills gap" is frequently used to refer to the difference between the skills needed for a job versus those skills processed by a prospective worker (ACT, 2011). Specifically, the "skills gap" for middle-skills jobs makes up the largest shortage of qualified workers in U.S. and Nevada labor market. These middle-skills jobs require more education and training than a high school diploma but less than a four-year college degree. Between 2010 and 2020, middle-skills jobs will constitute almost half of all job openings in Nevada (see Figure 3).

Figure 3. *Job openings by skill level in Nevada, 2010-2020.*



Source: *National Skills Coalition*

The impending retirement of baby boomers will only leave the gap wider and deeper. In addition, constant technological innovation has changed our work environment and will continue to create more new occupations. The landscape is shifting when millennials, the generation born between approximately 1982 and 2001, enter the workforce. Millennials have spent their entire lives with digital technology and nearly instantaneous information accessibility. How do educators prepare students for high-tech careers when they themselves may still be learning the technology?

The required skills may be aimed at technology but are built upon higher-order thinking skills such as interpersonal communication, reasoning, and problem solving. The Organization for Economic Cooperation and Development (OECD) proposed that 21st-century skills include learning and innovation skills (e.g., critical thinking, problem solving, innovation, communication, and collaboration), information, media, and technology skills (e.g., information, media, and technology literacy), and life and career skills (e.g., flexibility, adaptability, self-direction, social skills, leadership, and responsibility). Information, media, and technology literacy are aligned with technology development, but learning and innovation skills and life and career skills are fundamental soft skills for all kinds of jobs.

CTE is the ideal path preparing workforce for middle-skills jobs and the key for preparing the workforce of the 21st century. CTE programs play a unique role in making the connections with local business in various sectors, facilitating conversations between teaching and community needs, setting clear expectations for the outcomes of programs, and integrating real-world experience for both students and teachers. CTE programs offer opportunities to access the knowledge, skills, and experience needed for students get ready for whatever career pathways they choose. CTE is seen as key to building a pipeline of opportunity-ready workers.

High Quality CTE Programs and their Characteristics

Distinguished from older models of vocational programs that contributed little to college prep or experiences beyond the classroom (Imperatore & Hyslop, 2015), high-quality CTE programs offer a promising solution to improve graduation rates, labor market earnings and, most importantly, prepare the workforce with skills needed for the 21st century (Holzer, Lane, Rosenblum, & Andersson, 2011). There is no single standard for levels of quality of CTE programs, and different states have different emphases. Researchers also provided their perspectives. For example, Symonds, Schwartz, and Ferguson (2011) proposed a blueprint of tomorrow's high-quality CTE programs:

- Clear pathways to all major occupations should be delineated out when high school starts
- Work-linked learning should be available at the secondary level and beyond
- Employer roles should be expanded starting at middle school
- Mutual obligations from schools, employers, and government should be spelled out

James Stone, director of the National Research Center for CTE, concluded four key elements of high-quality CTE from research data (Stone, 2013): (a) rigorous programs/curriculum; (b) effective pedagogy, such as work-based learn-

ing and dual/concurrent enrollment; (c) a systems approach that integrates levels and sectors of education and industry; and (d) professional development.

Holzer, Linn, and Monthey (2013) highlighted eight characteristics of high-quality CTE programs that they believed as the most important:

1. Career-Oriented Educational Systems
   - CTE should be recognized as an integral part of the secondary school system at the district and state levels
   - A coherent education system that prepares both college and career ready students
2. Strong Options for All Students
   - High-quality CTE should be accessible to all people at different stages of life
   - No particular track should prevent students from changing plans afterwards
3. Rigorous Academic Curricula
   - CTE curricula should be consistent with the rigorous state standards in core content areas
   - Contextualized learning that integrates academic materials into projects or workplace should be emphasized
   - CTE programs can also provide direct pathways to higher education, such as dual and concurrent enrollment options
4. Rigorous Technical Skill Development
   - States and local districts can adopt/adapt/develop standards and curricula in collaboration with local businesses
   - CTE "program of study" must be carefully aligned with the skill requirements of particular occupations within the 16 career clusters
5. Employability Skills
   - CTE programs offer opportunities for work-based learning and work experience to develop skills such as communication, reasoning, problem-solving, and teamwork
6. Professional Development for Teaching Staff and Leaders
   - CTE teachers need support to integrate academic skills into instruction and develop pedagogical skills; Administrators, academic teachers, and counselors need greater understanding of the purpose and the course of study of each CTE program
7. Support Services for Students
   - Contextual remediation, small learning communities, career counseling and information, and involvement with CTSOs
8. Assessment and Accountability
   - At the program level, postsecondary programs should be held accountable for placement in the workplace or further education
   - At the federal or state level, departments of labor and educational institutions should collaborate and share data to accurately report the success of CTE programs at all levels

In October 2016, the Nevada State Board of Education approved the Nevada CTE Quality Program Standards (QPS) that specify responsibilities of the student, teacher, counselor, and school administration for establishing and maintaining highly effective CTE programs (Nevada Department of Education, n.d.). The QPS display rigorous and relevant expectations for program organization and delivery and, therefore, serve as guidance for school districts and charter schools to design, implement, assess, and improve CTE programs. The CTE QPS include the following areas:

- QPS 1.0: Career Guidance
- QPS 2.0: Program and Instruction
- QPS 3.0: Leadership Development
- QPS 4.0: Educational Personnel
- QPS 5.0: Program Planning and Promotion
- QPS 6.0: Facilities, Equipment, and Instructional Materials and Supplies
- QPS 7.0: Community, Business and Industry Partnerships
- QPS 8.0: Evaluation Systems and Accountability

These performance standards are further defined and measured by specific performance indicators in the site-based self-assessment instrument and on-site monitoring instrument.

Conclusions and Recommendations for Policy and Practice

Career and Technical Education (CTE) is an educational model that links secondary and postsecondary education to selected labor market indicators. Overall, CTE has been instrumental in solving some of the most critical problems affecting America's educational system. A major educational goal in Nevada is to prepare secondary and postsecondary students through sequences of CTE courses leading to gainful employment and college

readiness.

Secondary and postsecondary funding in Nevada is becoming better aligned with the state's goals and priorities. The total Perkins funds received for Fiscal Year 2015 totaled $9,650,599, about $70,000 more than in 2014. The distribution to secondary education was 68 percent, with the balance directed to postsecondary education (Advance CTE, n.d.).

CTE programs provide students with the knowledge, skills, and experience necessary to compete in today's workforce, as revealed by several CTE success stories across the nation (e.g., see link http://gacte.org/2016/03/from-dalton-high-to-the-heights-of-philly/).

It is anticipated that the bipartisan bill, Strengthening Career and Technical Education for the 21st Century Act (H.R. 5587), will help more Nevadans acquire the tools they need to fill high- and middle-skill jobs. The bill was recently approved unanimously by the Education and Workforce Committee.

In Nevada, 21st-century CTE appears to be a powerful program that provides students with a robust combination of academic, technical, and employability skills. Nevada CTE data suggest that CTE completers are likely to graduate at a higher rate than the overall graduation rate for all Nevada students (Nevada Department of Education, n.d.). In essence, CTE is a viable and proven path to achieve career and college readiness for students in Nevada.

In the past, CTE programs consisted of seven program areas. However, today's CTE programs are organized by 16 career clusters and 79 career pathways. In Nevada, CTE programs are organized by 15 career clusters and 75 career pathways. Thus, CTE prepares students for a variety of career choices.

As technology becomes the predominant factor for productivity in the American and global economies, a growing skills gap continues to emerge. According to Burke (2013), by 2020, 65 percent of all jobs will require a postsecondary credential. Therefore, CTE programs are more likely to provide change agents to reduce the skills gap and provide a pipeline of workers for the most demanding areas in Nevada, including skilled trades, hospitality and tourism, health occupations, and information technology.

High-quality CTE programs will likely have a positive impact on Nevada's future competitiveness through student engagement by providing hands-on context and a rigorous academic course load.

Recommendations from the field suggest that education leaders in Nevada should consider:

- Ensuring the availability of adequate funding for CTE programs at all levels. In order to be competitive in the global economy, global-preparedness starts with education.
- Reevaluating where current funding priorities are less effective.
- Investing in the expansion of existing CTE programs. Further expansion is likely to strengthen community ties between schools and employers.
- Providing more emphasis on digital literacy skills.
- Creating assessments to measure career and college readiness before 12th grade.
- Closing the skill gaps by providing all students with access to CTE that delivers the knowledge and skills necessary to be competitive in the global workplace.
- Supporting high quality teaching in all content areas. Thus, strong emphasis on effective teaching methods for new teachers coming from business and industry.
- Encouraging more collaboration between core academic and CTE teachers in creating improvement plans.
- Working closely with business leaders to determine the state system for industry credentials.

Suggested Next Steps for Nevada

Nevada should consider developing comprehensive CTE work-based learning (WBL) methods of instruction. In the Commonwealth of Virginia, the following seven WBL methods of instruction are currently practiced and are listed from lowest to highest degree of engagement:

1. Job shadowing
2. Mentorship
3. Service learning
4. Internship
5. Clinical experience
6. Student apprenticeship
7. Cooperative education

In Virginia, students in grades 6-8 are

exposed to career exploration WBL methods (i.e., job shadowing, mentorship, introductory internship). Students in grades 9 and 10 are engaged in pre-professional development WBL methods (extended internship, service learning). In the third phase, grades 11 and 12 students are strengthening their career awareness through clinical experience, student apprenticeship, and cooperative education (also known as career preparation WBL methods) (Virginia Department of Education, 2014, pp.1-6).

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