

**AED**  
FOUNDATION



**WILLIAM & MARY**  
PUBLIC POLICY



# **THE EQUIPMENT INDUSTRY TECHNICAL WORKFORCE: ADDRESSING THE TECHNICIAN SHORTAGE**

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## Executive Summary

Following a 2015 report by three William & Mary Program in Public Policy graduate students titled *AED and the Skills Gap: Assessing the Skills Gap, Its Causes, and Possible Solutions*, The Associated Equipment Distributors Foundation requested a follow-up report seeking to identify methods to mitigate the skills gap affecting the construction equipment industry and the resulting \$2.4 billion in annual foregone revenue facing AED members. Most importantly, AED sought guidance that association members can take to close the skills gap in their own districts. The following report focuses on Career and Technical Education (CTE), one of the main proxies by which skilled technicians receive training to prepare them for the skilled-labor workforce. In the examination of CTE, this report seeks to identify the reasons for the collapse of high school CTE and the resulting effect on the economy. The report also identifies best practices at the secondary (and to a lesser extent, the postsecondary) education level in delivering successful CTE programs.<sup>1</sup> Next, the report provides a detailed overview of CTE funding levels from federal and state sources. Finally, the report identifies key access points at the secondary and postsecondary education levels via individual state “playbooks”; AED members should use these playbooks as a guide in order to contribute to closing the skills gap.

## CTE & Skills Gap Overview

A gap between the technical-based skills needed by businesses and the skill sets possessed by American workers currently exists in the American workforce. This skills gap is especially apparent in the heavy equipment distribution industry, which is represented by Associated Equipment Distributors (AED). Businesses in this sector of the economy sell heavy equipment that requires skilled technicians to maintain the equipment and allow it to operate at its peak capacity. The current lack of trained technicians makes it difficult for businesses to expand and affects the development of new projects and the additional employees who would be hired to complete the projects.

In the 2015 report *AED and the Skills Gap*, William and Mary Public Policy students identified the skills gap and performed an economic analysis to measure the size of the gap and possible causes.<sup>2</sup> The report concluded that 84% of manufacturing executives indicate that a technical gap does exist, and 67% of executives report that their own employees lack adequate training. An analysis of the manufacturing industry indicated that businesses are currently losing 11% of earnings and 9% of revenue due to the inability to locate qualified workers. Among AED members, 60% indicated that the skills gap has made it difficult for their businesses to meet

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<sup>1</sup> In order to develop our “Best Practices List,” we researched interest group resources that characterize the different methods of CTE delivery. These groups, which advocate for the development and sustainability of CTE programs, include ACTE and Advance CTE.

<sup>2</sup> Danny Berg, Josh Klein, and Will Nisbet, “AED and the Skills Gap: Assessing the Skills Gap, its Causes, and Possible Solutions,” (student research project for the William and Mary Public Policy Program, December 2015).

customer demand. The technical skills gap is a significant problem for both employers who need qualified employees and individuals who have difficulty finding gainful employment due to their lack of relevant skills.

There are many factors that have combined to create the current skills gap, including the failure to provide technical training, poor perceptions of vocational careers among youth, and the rapidly retiring Baby Boomer Generation. Our current educational system places great emphasis on providing a traditional four-year college education for as many students as possible. However, this emphasis does not consider current workforce demand or the many students who excel in technical-based skills rather than traditional classroom academics. Society is also to blame for the four-year college push, as technical jobs have been viewed as fallbacks for students who cannot succeed in a traditional college setting rather than respectable professions that can provide an excellent standard of living. The Baby Boomer Generation contains relatively more technically-trained workers than the rising Millennial Generation. As these Baby Boomers begin to retire, there are not enough trained workers to fill the technician job openings.

Nationwide, high school CTE program offerings have seen a collapse over the past two decades. One reason for this reduction in programming is the difficulty of attracting qualified teachers. Between 1994 and 2004, approximately 2.7 million teachers left the career and technical teaching field, while only 2.25 million were hired to fill the positions.<sup>3</sup> It is estimated that public school teacher turnover costs the nation over \$7.3 billion per year.<sup>4</sup> While student demand for CTE courses has increased, many teacher education programs have been terminated. The overall trend of increased teacher retirement also affects the CTE field. One reason for the difficulty schools have in recruiting CTE teachers is the significant pay cut that many professionals would have to take in order to become full-time teachers. According to the Bureau of Labor Statistics, the median pay for CTE teachers in 2015 was \$52,800.<sup>5</sup> Depending on the specific occupation and local demand, this amount may be much lower than what a skilled individual could earn as a practicing technician. One solution to this wage issue is to allow industry professionals to teach CTE courses part-time while maintaining their primary careers. The CTE instructor gap can also be addressed by creating alternative certification pathways for individuals to obtain teaching licenses more quickly than the traditional route. These programs could include pathways for current industry professionals to quickly obtain the certification needed to bring their expertise into the classroom. States should also focus on professional development programs to ensure that current CTE teachers are retained.

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<sup>3</sup> Nancy Conneely and Erin Uy, “Teacher Shortage Undermines CTE,” *National Association of State Directors of Career Technical Education Consortium*, accessed December 12, 2016.

<sup>4</sup> Ibid.

<sup>5</sup> “Career and Technical Education Teachers,” Bureau of Labor Statistics, December 17, 2015, accessed December 12, 2016, <http://www.bls.gov/ooh/education-training-and-library/career-and-technical-education-teachers.htm>.

Declining state tax revenue has also played a role in states' decisions to reduce CTE course offerings.<sup>6</sup> Some states have shifted their focus away from high school CTE programs to more cost effective postsecondary offerings. These states require high school students to attend community colleges in order to participate in CTE courses. The time and cost of traveling to the designated locations may disincentivize secondary student participation. Alternative funding methods can provide some relief on the secondary education front. For example, the Carl D. Perkins Career and Technical Education Act of 2006 has provided federal funding for many states to develop CTE programs. However, the future of this funding source remains uncertain, as the Act has not yet been fully reauthorized since 2006.

Despite the difficulties of creating and maintaining state CTE programs, there is a renewed emphasis on vocational curriculum. As policy makers search for avenues to grow the economy and reduce unemployment, technical education has become a focal point. Most states now offer programming designed to provide students with the knowledge needed to gain industry certification in technical fields. As these programs continue to develop, it is essential that industry stakeholders become involved in local curriculum development in order to ensure that the programs produce the skilled workers that local businesses need. As student skills are matched with labor market demand, the school system will be able to change public perceptions of vocational education. When the skills gap is filled, industry will be able to grow and workers will be able to secure stable employment that offers a respectable standard of living.

## Economic Impact Estimate

Relying on a 2005 article titled *The Impacts of Career-Technical Education on High School Labor Market Success*, the group identified the lifetime economic impact for a skilled-worker across various bundles of CTE coursework at the high school level.<sup>7</sup> Using a nationally-representative longitudinal sample that tracked 8<sup>th</sup> graders in 1988 every two years through 1994 and then once more in 2000, the authors estimate the increased annual salary of taking three different CTE-bundles at two different points in time when compared to the average annual income of the overall class.<sup>8</sup> They measure “short-term” outcomes (a measure of the increase in salary in 1993, approximately one year after graduation), and medium-term outcomes (a measure in the increase in annual salary in year 2000).

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<sup>6</sup> John H. Bishop and Ferran Mane, “The Impacts of Career-Technical Education on High School Labor Market Success,” *Economics of Education Review* 23 (2004): 381-402, 383.

<sup>7</sup> Ibid.

<sup>8</sup> Bishop and Mane, 388. The study implements “micro data from the National Educational Longitudinal Study (NELS-88), a longitudinal data set that followed a nationally representative sample of 8<sup>th</sup> graders every two years through 1994 and then once more in 2000.” The study focused on “NELS:88 high school graduates who were in public schools in 10<sup>th</sup> grade and earned between 15 and 32 Carnegie units during high school and graduated in 1992 or 1993.”

The short-term and medium-term outcomes are subdivided along three different CTE-course bundles: the effects of combining one computer course with two advanced non-computer occupation-specific CTE courses accompanied by no reduction in academic or personal interest courses (Bundle I); the effects of taking four advanced non-computer CTE courses and taking two fewer academic courses and one fewer personal interest course (Bundle II); and the effect of taking two advanced non-computer CTE courses and two computer CTE courses while giving up two academic courses (Bundle III).<sup>9</sup> In order to aggregate the increased earnings across a worker’s lifetime, we took the increases in annual earnings (expressed in 2016 dollars) and aggregated them over a 46-year period (from ages 19 to 65, or the age at which an individual becomes eligible for Social Security). We calculated the first seven years’ additional earnings at the same rate (the first year’s additional earnings rate) and the remaining years’ additional earnings at the eight-year rate (this potentially biases our estimate of total additional earnings downward). We then subtracted the costs (in 2016 dollars) of providing each bundle of classes per student (\$7,176.12 for Bundle I, \$4,783.61 for Bundle II, and \$6,401.04 for Bundle III). The following are the net present values of the various bundles expressed in 2016 dollars:<sup>10</sup>

Economic Impact Estimate			
	2% Interest Rate	4% Interest Rate	6% Interest Rate
<b>Bundle I</b>	<b>\$51,068.08</b>	<b>\$31,936.61</b>	<b>\$20,704.18</b>
<b>Bundle II</b>	<b>\$75,742.51</b>	<b>\$50,862.90</b>	<b>\$36,156.76</b>
<b>Bundle III</b>	<b>\$89,936.53</b>	<b>\$57,542.32</b>	<b>\$38,570.31</b>

The authors also calculated the increase in wages from an additional CTE course (by type). An additional advanced-CTE course (non-computer) resulted in an increase in annual earnings of \$414.23 in the short-term (approximately one year following graduation) and \$507.37 in the medium-term (approximately eight years following graduation); the cost per student is approximately \$2,126.46. An additional computer CTE course resulted in an additional \$1,160.51 in annual income in the medium-term (approximately eight years after graduation) yet only cost approximately \$2,658.07. As demonstrated with the analysis of the CTE bundles above, the aggregate lifetime gains of the income increases would far outweigh the one-year cost of providing the respective classes.

## Overview of State Playbooks

<sup>9</sup> Bishop and Mane, 388-391. “Computer courses include courses in keyboarding taught in high school, word processing, computer applications and programming. Advanced occupational vocational courses [include] courses in agriculture, appliance repair, auto mechanics, business, construction, health occupations, metal-working, etc. Academic courses include English, foreign languages, mathematics, science and social studies. Personal interest courses include art, music, health, physical education, and driver education.”

<sup>10</sup> These estimates are based off economic conditions for the original periods in which the authors estimated the effects of additional CTE courses on income. It is likely that the current impact is different; without controlling for recent trends in unemployment and economic growth, it is difficult to comment on similarities between estimates.



In order to assist AED members to become involved in CTE at the local and state levels, we assembled fifty state “playbooks.” Each playbook provides information regarding several “access points” within a given state; these “access points” represent excellent opportunities for member engagement. Opportunities include, but are not limited to, program advisory committees (which consult on various issues of CTE programs at the secondary and postsecondary levels including curriculum development and credentialing), work-based learning opportunities that allow members to access and develop new talent, workforce development programs, advocacy opportunities, and state and local initiatives aimed at improving CTE at the secondary and postsecondary levels. As each state necessarily operates its CTE program in a unique way, there are various contextual differences in these opportunities across the nation.

Furthermore, each playbook maintains information regarding recent funding levels as well as key state CTE contacts that members can reach out to for more information on their state’s CTE programs and opportunities to become involved. Many of the playbooks incorporate estimates of economic impacts at the state level (derived from Advance CTE and the Common Good Forecaster) that can be used as talking points when advocating for the development or expansion of CTE programs. Finally, each playbook lists CTE courses and/or programs in the state that are relevant to AED members. Members should contact their local school divisions or Local Education Agencies to discern the availability of these courses and/or programs within their area and potential opportunities to develop them if they do not already exist. The fifty state playbooks are included as an attachment to this report.

## Overview of Best Practices Scorecard

In order to identify best practices in the delivery of CTE, we relied on key indicators of CTE quality examined by at least two interest groups (ACTE and Advance CTE). We then conducted extensive state-level research to identify the states that are implementing the various best practices. The list of practices includes:

- 1. Does the state maintain local flexibility in developing new CTE programs or transitioning away from underperforming programs?** Many states permit localities to adjust CTE offerings, yet the requirements to do so vary. For example, some states require the demonstration of a local need or reliance on labor force data. This indicator measures if, at a basic level, localities can develop new CTE programs.
- 2. Do CTE providers in the state actively align or integrate traditional academic coursework with CTE coursework?** Integration can be defined rather loosely. While all states require that students complete coursework in traditional academic content areas, not all CTE courses actively incorporate traditional academic elements into their content. However, any effort within the state suffices for this indicator.
- 3. Do states maintain articulation agreements?** Articulation ensures that students have the opportunity to earn postsecondary credit for secondary CTE coursework. This encourages continued educational pursuits when postsecondary education may be required to gain the requisite skills necessary to an industry.

4. **Do states implement performance-funding?** Performance funding bases CTE funding off various indicators of performance, such as enrollment numbers and the number of students earning credentials. States sometimes implement performance-funding strategies in determining how federal and state education funds are spent. Given current fiscal constraints faced by states, performance funding represents an opportunity to ensure that high quality programs are receiving appropriate funding. The information for this indicator came from a 2014 U.S. Department of Education report (*State Strategies for Financing Career and Technical Education*).<sup>11</sup>
5. **Do employers participate in the development of state-required CTE standards (i.e. drafting, reviewing, and/or validating)?** The information for this indicator came from a report by Advance CTE titled *The State of Career and Technical Education: Employer Engagement in CTE*. The indicator analyzes the opportunity of employers to directly affect the content and delivery of CTE in their states.<sup>12</sup>
6. **Do employers participate in the state’s selection process of preferred credentials for use in CTE programs?** This indicator identifies employer participation in the selection of state credentials to be used within CTE programs; it does not include employer participation at the local level (members should refer to the state playbooks for opportunities at the local level).
7. **Do students have access to career services (can be in-school, online, or various other methods of delivery)?** Career services help active and potential CTE students explore career options and provide guidance throughout the education process.
8. **Do work-based learning opportunities exist within the state?** Various forms of work-based learning exist (e.g. internships, externships, job shadowing, apprenticeships, cooperative education). This indicator identifies if there are opportunities for employers to access and develop new talent through the CTE system.
9. **Do AED-relevant courses/pathways/programs exist?** This identifies whether or not there are AED-relevant CTE options in the state and should inform decisions regarding advocacy for CTE development.
10. **Do education systems maintain a pool of experts for professional development?** Continued professional development is critical to instructors’ ability to properly train CTE students. This indicator identifies if professional development services contribute to continued training by maintaining connections with industry stakeholders or interest groups.

We also identified an additional “bonus” indicator as well as the type of funding at the secondary and postsecondary levels.

1. **Bonus indicator: Do intermediaries exist?** For this indicator, we attempted to identify intermediary groups that facilitate CTE delivery in the state. “Intermediaries” includes a variety of groups, including but not limited to non-profit groups that assist in work-based

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<sup>11</sup> U.S. Department of Education, “State Strategies for Financing Career and Technical Education,” National Center for Innovation in Career and Technical Education, October 2014, [http://s3.amazonaws.com/NCICTE/pdf/NCICTE\\_CTE\\_Finance\\_Study.pdf](http://s3.amazonaws.com/NCICTE/pdf/NCICTE_CTE_Finance_Study.pdf).

<sup>12</sup> Advance CTE, “The State of Career Technical Education: Employer Engagement in CTE,” 12, [https://www.careertech.org/sites/default/files/State-of-CTE\\_Employer-Engagement\\_FINAL.pdf](https://www.careertech.org/sites/default/files/State-of-CTE_Employer-Engagement_FINAL.pdf).



learning programs, government entities formed by Perkins funding that assist in CTE delivery, or contracted agencies that serve as resource centers for instructors.

2. **Secondary funding.** This indicator tells whether state secondary CTE funding is categorical (i.e. earmarked specifically for CTE) or foundational (i.e. part of the overall education appropriation). If categorical, the scorecard identifies how earmarked funds are appropriated.
3. **Postsecondary funding.** This indicator tells whether state postsecondary CTE funding is categorical (i.e. earmarked specifically for CTE) or foundational (i.e. part of the overall education appropriation). If categorical, the scorecard identifies how earmarked funds are appropriated.

## Acknowledgements

We would like to thank The Associated Equipment Distributors Foundation for the opportunity to participate in the ongoing study of the skills gap and its effects on the heavy equipment industry. We would also like to thank the various parties that responded to our inquiries regarding CTE in the states. We are very grateful for the guidance provided by Professor Sarah Stafford (Director, William & Mary Program in Public Policy), as well as Professor John Parman. Finally, this project would not have been possible without the contributions of our research assistant, Jake Da Silva Passos-Hoioos.

## Best Practices Scorecard

State	Local Flexibility	Academic Integration	Articulation	Performance Funding	Standards Input	Credentials Input
Alabama	Yes	Yes	Yes	No	Yes	Yes
Alaska	Yes	Yes	Yes	No	No	Yes
Arizona	Yes	Yes	Yes	Yes	Yes	Yes
Arkansas	Yes	Yes	Yes	Yes	N/A	N/A
California	Yes	Yes	Yes	No	Yes	No
Colorado	Yes	Yes	Yes	No	No	Yes
Connecticut	Yes	Yes	Yes	No	No	No
Delaware	Yes	Yes	Yes	No	Yes	No
Florida	Yes	Yes	Yes	Yes	Yes	Yes
Georgia	Yes	Yes	Yes	Yes	Yes	Yes
Hawaii	No	Yes	Yes	No	Yes	Yes
Idaho	Yes	Yes	Yes	No	Yes	No
Illinois	No	Yes	Yes	No	No	No
Indiana	Yes	Yes	Yes	No	Yes	Yes
Iowa	Yes	Yes	Yes	No	No	No
Kansas	Yes	Yes	Yes	Yes	Yes	Yes
Kentucky	Yes	Yes	Yes	No	Yes	Yes
Louisiana	Yes	Yes	Yes	No	Yes	Yes
Maine	Yes	Yes	Yes	No	Yes	Yes
Maryland	Yes	Yes	Yes	No	Yes	Yes
Massachusetts	Yes	Yes	Yes	No	Yes	Yes
Michigan	Yes	Yes	Yes	No	Yes	No
Minnesota	Yes	Yes	Yes	Yes	Yes	Yes
Mississippi	No	Yes	Yes	No	Yes	Yes
Missouri	Yes	Yes	Yes	Yes	Yes	No
Montana	Yes	Yes	Yes	No	Yes	Yes
Nebraska	Yes	Yes	Yes	No	Yes	No
Nevada	No	Yes	Yes	No	Yes	No
New Hampshire	Yes	Yes	Yes	No	Yes	Yes
New Jersey	Yes	Yes	Yes	No	Yes	No
New Mexico	No	Yes	Yes	No	No	Yes
New York	Yes	Yes	Yes	No	No	No
North Carolina	Yes	Yes	Yes	No	Yes	Yes
North Dakota	Unclear	Yes	Yes	Yes	Yes	No
Ohio	Yes	Yes	Yes	No	Yes	Yes

Best Practices Scorecard						
State	Local Flexibility	Academic Integration	Articulation	Performance Funding	Standards Input	Credentials Input
Oklahoma	Yes	Yes	Yes	No	Yes	No
Oregon	Yes	Yes	Yes	No	Yes	No
Pennsylvania	Yes	Yes	Yes	No	Yes	Yes
Rhode Island	Yes	Yes	Yes	No	Yes	No
South Carolina	Yes	Yes	Yes	Yes	Yes	No
South Dakota	Yes	Yes	Yes	No	Yes	Yes
Tennessee	Yes	Yes	Yes	No	Yes	No
Texas	Yes	Yes	Yes	Yes	Yes	No
Utah	Yes	Yes	Yes	No	Yes	Yes
Vermont	Yes	Yes	Yes	No	Yes	No
Virginia	Yes	Yes	Yes	No	Yes	Yes
Washington	Yes	Yes	Yes	No	No	Yes
West Virginia	Yes	Yes	Yes	Yes	Yes	Yes
Wisconsin	No	Yes	Yes	No	Yes	Yes
Wyoming	Yes	Yes	Yes	No	Yes	No

Best Practices Scorecard					
State	Career Services	Work-Based Learning	Relevant Pathways	Professional Development	Intermediaries
Alabama	Yes	Yes	Yes	Yes	Yes
Alaska	Yes	Yes	Yes	Yes	
Arizona	Yes	Yes	Yes	Yes	
Arkansas	Yes	Yes	Yes	Yes	
California	Yes	Yes	Yes	Yes	
Colorado	Yes	Yes	Yes	Yes	
Connecticut	Yes	Yes	Yes	Yes	
Delaware	Yes	Yes	Yes	Yes	
Florida	Yes	Yes	Yes	Yes	N/A
Georgia	Yes	Yes	Yes	Yes	Yes
Hawaii	Yes	Yes	Yes	Yes	
Idaho	Yes	Yes	Yes	Yes	
Illinois	No	Yes	Yes	Yes	N/A
Indiana	No	Yes	Yes	Yes	Yes
Iowa	Yes	Yes	Yes	Yes	
Kansas	Yes	Yes	Yes	Yes	Yes
Kentucky	No	Yes	Yes	Yes	Yes
Louisiana	No	Yes	Yes	Yes	N/A
Maine	Yes	Yes	Yes	Yes	N/A
Maryland	Yes	Yes	Yes	Yes	N/A
Massachusetts	Yes	Yes	Yes	Yes	Yes
Michigan	Yes	Yes	Yes	Yes	
Minnesota	Yes	Yes	Yes	Yes	
Mississippi	No	Yes	No	Yes	
Missouri	Yes	Yes	Yes	Yes	Yes
Montana	Yes	Yes	Yes	Yes	Yes
Nebraska	No	Yes	Yes	Yes	Yes
Nevada	No	Yes	Yes	Yes	
New Hampshire	Yes	Yes	Yes	Yes	
New Jersey	Yes	Yes	Yes	Yes	Yes
New Mexico	No	Yes	No	Yes	
New York	Yes	Yes	Yes	Yes	
North Carolina	Yes	Yes	Yes	Yes	
North Dakota	No	Yes	No	Yes	Yes
Ohio	Yes	Yes	No	Yes	

Best Practices Scorecard					
State	Career Services	Work-Based Learning	Relevant Pathways	Professional Development	Intermediaries
Oklahoma	Yes	Yes	Yes	Yes	
Oregon	Yes	Yes	Yes	Yes	
Pennsylvania	Yes	Yes	Yes	Yes	
Rhode Island	Yes	Yes	Yes	Yes	
South Carolina	Yes	Yes	Yes	Yes	
South Dakota	No	Yes	No	Yes	Yes
Tennessee	No	Yes	Yes	Yes	N/A
Texas	Yes	Yes	Yes	Yes	
Utah	Yes	Yes	Yes	Yes	
Vermont	Yes	Yes	Yes	Yes	Yes
Virginia	Yes	Yes	Yes	Yes	Yes
Washington	Yes	Yes	Yes	Yes	
West Virginia	No	Yes	Yes	Yes	
Wisconsin	No	Yes	Yes	Yes	N/A
Wyoming	Yes	Yes	Yes	Yes	



Best Practices Scorecard		
State	Secondary Funding	Postsecondary Funding
Alabama	Categorical	Categorical
Alaska	Categorical	General
Arizona	Categorical	General
Arkansas	CTE Centers	General
California	Grants	General
Colorado	Categorical	General
Connecticut	CTE Centers	General
Delaware	Categorical	No Data
Florida	Categorical	No Data
Georgia	Categorical	General
Hawaii	Categorical	General
Idaho	Categorical	General
Illinois	Categorical	General
Indiana	Categorical	General
Iowa	Categorical	General
Kansas	Categorical	Categorical
Kentucky	Categorical	No Data
Louisiana	Categorical	No Data
Maine	Categorical	General
Maryland	General	General
Massachusetts	Categorical	No Data
Michigan	Categorical	General
Minnesota	Categorical	General
Mississippi	Categorical	General
Missouri	Categorical	General
Montana	No data	No Data
Nebraska	General	General
Nevada	Categorical	No Data
New Hampshire	CTE Centers	No Data
New Jersey	CTE Centers	General
New Mexico	General	General
New York	CTE Centers	General
North Carolina	Categorical	No Data
North Dakota	Categorical	General
Ohio	Categorical	CTE Centers

Best Practices Scorecard		
State	Secondary Funding	Postsecondary Funding
Oklahoma	Categorical	CTE Centers
Oregon	General	General
Pennsylvania	Categorical	No Data
Rhode Island	Categorical	General
South Carolina	Categorical	General
South Dakota	Grants	Categorical
Tennessee	Categorical	General
Texas	Categorical	Categorical
Utah	Categorical	General
Vermont	CTE Centers	Grants
Virginia	Categorical	Categorical
Washington	Categorical	No Data
West Virginia	Categorical	Categorical
Wisconsin	General	Categorical
Wyoming	Categorical	No Data

Color Key	Details
General	General Funding
Categorical	Student-based
Categorical	Cost-based
Categorical	Unit-based
Categorical	Other/Unspecified
CTE Centers	Only earmarked funds
Grants	Competitive grants

# FEDERAL FUNDING MATRIX

Federal Funding									
State	Total Federal Education Funding	Total Federal CTE Funding	% Change In CTE Funding (2014-2015)	Total % Change from 2010-2015	Total for Local Distribution	\$ for CTE Colleges	% of Federal \$ for CTE Colleges	Federal \$ for HS	% of Federal \$ for CTE HS
Alabama	1,094,633,621	\$19,175,065	0%	0%	\$16,299,806	\$4,889,642	0.45%	\$10,268,248	0.94%
Alaska	319,446,174	\$4,214,921	0%	0%	\$3,582,683	\$483,662	0.15%	\$2,740,753	0.86%
Arizona	2,157,121,941	\$25,381,742	-2%	-1%	\$21,574,481	\$3,236,172	0.15%	\$16,504,481	0.77%
Arkansas	670,358,453	\$11,403,795	0%	3%	\$9,693,227	\$2,180,975	0.33%	\$6,542,928	0.98%
California	8,328,868,355	\$120,256,718	2%	6%	\$101,990,831	\$49,039,707	0.59%	\$47,908,996	0.58%
Colorado	957,794,503	\$16,063,569	-1%	-1%	\$13,654,034	\$7,373,178	0.77%	\$4,915,452	0.51%
Connecticut	633,986,526	\$9,508,414	0%	5%	\$8,082,152	\$1,421,974	0.22%	\$6,062,099	0.96%
Delaware	189,473,955	\$4,725,500	0%	2%	\$4,016,675	\$542,251	0.29%	\$3,072,756	1.62%
D.C.	251,749,402	\$4,214,921	0%	0%	\$3,582,921	\$582,683	0.23%	\$3,000,238	1.19%
Florida	3,940,482,538	\$62,408,887	-1%	-5%	\$57,766,250	\$27,697,433	0.70%	\$27,465,747	0.70%
Georgia	2,171,351,522	\$38,555,844	-1%	0%	\$32,772,468	\$15,781,234	0.73%	\$14,747,611	0.68%
Hawaii	243,230,249	\$5,496,906	0%	4%	\$4,772,216	\$2,386,108	0.98%	\$2,386,108	0.98%
Idaho	344,425,749	\$6,394,554	0%	0%	\$5,435,371	\$1,712,142	0.50%	\$3,179,692	0.92%
Illinois	2,847,534,142	\$40,365,798	0%	11%	\$34,310,929	\$13,724,371	0.48%	\$20,586,557	0.72%
Indiana	1,524,904,564	\$24,933,706	0%	3%	\$22,389,250	\$7,000,345	0.46%	\$13,588,905	0.89%
Iowa	719,787,623	\$11,963,946	0%	0%	\$10,169,355	\$4,949,561	0.69%	\$5,069,794	0.70%
Kansas	595,490,582	\$10,245,408	0%	4%	\$8,708,596	\$3,918,868	0.66%	\$3,918,868	0.66%
Kentucky	946,616,385	\$17,905,647	0%	0%	\$15,219,800	\$7,084,817	0.75%	\$7,373,993	0.78%
Louisiana	1,033,253,235	\$21,041,943	0%	0%	\$17,885,652	\$7,082,719	0.69%	\$9,014,368	0.87%
Maine	275,521,359	\$5,496,906	0%	4%	\$4,672,371	\$2,102,567	0.76%	\$2,102,567	0.76%
Maryland	973,150,796	\$15,181,537	1%	10%	\$12,904,306	\$4,290,682	0.44%	\$7,968,409	0.82%
Massachusetts	1,228,587,191	\$17,758,787	0%	6%	\$15,597,136	\$4,137,951	0.34%	\$11,187,794	0.91%
Michigan	2,173,553,767	\$37,153,058	0%	9%	\$31,580,100	\$12,623,040	0.58%	\$18,948,060	0.87%
Minnesota	1,064,687,963	\$16,684,637	0%	6%	\$14,181,941	\$7,402,973	0.70%	\$5,360,773	0.50%
Mississippi	761,992,048	\$13,363,550	0%	0%	\$11,359,017	\$5,331,048	0.70%	\$6,027,968	0.79%
Missouri	1,265,290,632	\$21,345,135	0%	6%	\$18,143,366	\$5,080,142	0.40%	\$13,063,224	1.03%
Montana	252,996,266	\$5,167,377	0%	4%	\$4,385,378	\$1,383,565	0.55%	\$2,569,478	1.02%
Nebraska	370,976,996	\$6,816,893	0%	0%	\$5,794,509	\$2,346,777	0.63%	\$2,868,282	0.77%
Nevada	415,384,610	\$9,741,942	-1%	-21%	\$8,280,651	\$2,398,076	0.58%	\$5,095,912	1.23%
New Hampshire	257,709,415	\$5,496,906	0%	4%	\$4,672,370	\$919,522	0.36%	\$3,565,952	1.38%
New Jersey	1,548,389,245	\$22,347,005	0%	6%	\$18,994,954	\$7,906,650	0.51%	\$9,663,683	0.62%
New Mexico	586,609,504	\$8,098,622	-1%	4%	\$6,883,828	\$3,097,722	0.53%	\$3,097,722	0.53%
New York	4,541,728,080	\$51,361,536	0%	17%	\$44,975,383	\$21,588,184	0.48%	\$23,387,199	0.51%
North Carolina	1,934,313,766	\$36,160,527	-1%	-1%	\$30,736,448	\$10,245,483	0.53%	\$18,490,965	0.96%
North Dakota	175,147,967	\$4,214,921	0%	0%	\$3,582,683	\$1,166,439	0.67%	\$2,166,244	1.24%
Ohio	2,227,602,163	\$42,750,001	0%	4%	\$36,337,501	\$3,997,125	0.18%	\$28,706,625	1.29%

# FEDERAL FUNDING MATRIX

State	Total Federal Education Funding	Total Federal CTE Funding	% Change In CTE Funding (2014-2015)	Total % Change from 2010-2015	Total for Local Distribution	\$ for CTE Colleges	% of Federal \$ for CTE Colleges	\$ for HS	% of Federal \$ for CTE HS
Oklahoma	813,447,717	\$15,094,180	0%	0%	\$12,830,053	\$1,847,528	0.23%	\$9,499,520	1.19%
Oregon	803,049,348	\$13,548,621	-1%	4%	\$11,516,328	\$5,182,348	0.65%	\$5,182,348	0.65%
Pennsylvania	2,353,765,856	\$40,722,778	0%	9%	\$34,614,361	\$10,384,308	0.44%	\$24,230,052	1.03%
Rhode Island	261,329,272	\$5,496,906	0%	4%	\$4,672,371	\$421,023	0.16%	\$3,791,348	1.45%
South Carolina	964,725,026	\$18,476,882	-1%	2%	\$15,705,350	\$4,711,605	0.49%	\$9,423,210	0.98%
South Dakota	274,740,632	\$4,214,921	0%	3%	\$3,192,805	\$1,596,403	0.58%	\$1,596,402	0.58%
Tennessee	1,273,612,700	\$23,122,059	0%	0%	\$19,653,750	\$2,653,256	0.21%	\$15,035,118	1.18%
Texas	5,624,372,406	\$92,114,336	0%	1%	\$81,159,922	\$25,580,275	0.45%	\$50,111,036	0.89%
Utah	683,501,407	\$12,501,001	-2%	4%	\$10,625,851	\$4,090,340	0.60%	\$6,135,511	0.90%
Vermont	160,046,921	\$4,214,921	0%	0%	\$3,582,682	\$833,631	0.52%	\$2,549,051	1.59%
Virginia	1,462,747,306	\$23,955,949	-1%	5%	\$20,362,556	\$3,054,383	0.21%	\$17,308,173	1.18%
Washington	1,165,976,081	\$20,610,734	1%	2%	\$17,519,124	\$8,829,639	0.76%	\$6,937,574	0.60%
West Virginia	487,737,540	\$8,428,617	0%	0%	\$7,164,325	\$2,047,937	0.42%	\$5,116,388	1.05%
Wisconsin	1,047,513,822	\$20,241,685	0%	5%	\$17,205,432	\$8,516,689	0.81%	\$7,742,444	0.74%
Wyoming	153,096,570	\$4,214,921	0%	0%	\$3,582,683	\$1,433,073	0.94%	\$2,149,610	1.40%
<b>Grand Totals:</b>	<b>\$66,553,813,890</b>	<b>\$1,080,355,135</b>							

## Legend

Column 8: "% of Federal \$ for CTE Colleges"	Column 7/Column 2 = % of Federal Education Funding Given to CTE Colleges
Column 10: "% of Federal \$ for CTE HS"	Column 9/Column 2 = % of Federal Education Funding Given to HS CTE

# STATE FUNDING MATRIX

State Funding										
State	Total Combined (Federal+State) Dollars Spent on Education	Total State Education Funding	Total State CTE Funding	\$ of State Postsecondary CTE Funds	% of State Educ. \$ Spent on Postsecondary CTE	Postsecondary State Expenditure	\$ of State Secondary CTE Funds	% of State Educ. \$ Spent on Secondary CTE	K-12 State Appropriations	
Alabama	\$6,400,011,577	\$5,305,377,956	\$37,833,577	5,253,906	0.10%	\$1,489,097,719	\$32,579,671	0.61%	3,816,280,237	
Alaska	\$2,387,224,274	\$2,067,778,100	*	*	*	\$774,012,400	*	*	1,293,765,700	
Arizona	\$7,824,457,141	\$5,667,335,200	\$11,576,300	*	*	\$1,781,046,400	\$11,576,300	0.20%	3,886,288,800	
Arkansas	\$3,540,737,201	\$2,870,378,748	\$35,994,997	*	*	\$767,930,601	*	*	2,102,448,147	
California	\$61,379,860,355	\$53,050,992,000	\$250,000,000	*	*	\$12,959,148,000	*	*	40,091,844,000	
Colorado	\$8,014,372,192	\$7,056,577,689	\$25,436,648	*	*	\$3,260,127,671	*	*	3,796,450,018	
Connecticut	\$3,498,097,370	\$2,864,110,844	\$155,632,696	*	*	\$731,219,842	*	*	2,132,891,002	
Delaware	\$1,395,813,255	\$1,206,339,300	\$327,800	*	*	\$226,594,000	*	*	979,745,300	
D.C.	\$1,688,114,175	\$1,436,364,773	*	*	*	\$72,457,573	*	*	1,363,907,200	
Florida	\$20,379,393,549	\$16,438,911,011	\$483,891,812	*	*	\$5,504,800,000	*	*	10,934,111,011	
Georgia	\$13,317,850,832	\$11,146,499,310	\$312,334,367	296,221,880	2.66%	\$2,272,302,668	16,112,487	0.14%	8,874,196,642	
Hawaii	\$1,667,527,910	\$1,424,297,661	*	*	*	\$364,724,797	*	*	1,059,572,864	
Idaho	\$2,003,225,849	\$1,658,800,100	\$53,079,000	38620000	2.33%	\$284,201,700	\$14,459,000	0.87%	1,374,598,400	
Illinois	\$8,930,749,842	\$6,083,215,700	\$59,276,600	\$21,214,500	0.35%	\$1,558,376,300	\$38,062,100	0.63%	4,524,839,400	
Indiana	\$9,854,425,769	\$8,329,521,205	\$4,445,697	\$3,232,794	0.04%	\$1,486,463,676	1,212,903	0.01%	6,843,057,529	
Iowa	\$4,413,471,071	\$3,693,683,448	\$17,741,038	\$15,110,904	0.41%	\$828,653,894	2,630,134	0.07%	2,865,029,554	
Kansas	\$3,725,687,165	\$3,130,196,583	\$106,300,961	82,300,961	2.629%	\$794,065,583	24,000,000	0.767%	2,336,131,000	
Kentucky	\$9,790,292,177	\$8,843,675,792	\$81,874,648	*	*	\$5,483,948,637	22,866,900	0.259%	3,359,727,155	
Louisiana	\$5,891,987,981	\$4,858,734,746	\$42,200,000	\$29,000,000	0.60%	\$1,644,982,672	13200000	0.27%	3,693,752,074	
Maine	\$1,661,168,340	\$1,385,646,981	\$9,982,868	*	*	\$270,774,213	*	*	1,114,872,768	
Maryland	\$5,931,917,994	\$4,958,767,198	*	*	*	\$1,870,157,912	*	*	3,088,609,286	
Massachusetts	\$6,779,514,377	\$5,550,927,186	\$8,950,000	\$6,200,000	0.11%	\$1,150,231,000	\$2,750,000	0.05%	4,400,696,186	
Michigan	\$13,065,465,367	\$10,891,911,600	\$932,100	*	*	\$1,877,219,000	932,100	0.01%	9,014,692,600	
Minnesota	\$10,258,755,963	\$9,194,068,000	\$5,680,000	*	*	\$1,623,747,000	*	*	7,570,321,000	
Mississippi	\$3,476,110,759	\$2,714,118,711	\$73,029,223	*	*	\$790,797,549	*	*	1,923,321,162	
Missouri	\$5,884,929,974	\$4,619,639,342	\$0,069,028	50,069,028	*	\$1,266,356,218	*	*	3,353,283,124	
Montana	\$1,057,980,936	\$804,984,670	\$8,775,934	\$7,275,934	0.90%	\$224,303,833	\$1,500,000	0.19%	580,680,837	
Nebraska	\$1,898,500,752	\$1,527,523,756	\$594,664	*	*	\$613,951,914	594,664	0.04%	913,571,842	
Nevada	\$2,566,555,566	\$2,151,170,956	\$688,233	*	*	\$789,867,555	*	*	1,361,303,401	
New Hampshire	\$1,343,046,644	\$1,085,337,229	\$7,343,010	*	*	\$126,500,000	*	*	958,837,229	
New Jersey	\$10,834,672,245	\$9,286,283,000	\$8,656,000	*	*	\$1,619,876,000	*	*	7,666,407,000	
New Mexico	\$3,924,559,204	\$3,337,949,700	*	*	*	\$832,924,300	*	*	2,505,025,400	
New York	\$25,913,297,080	\$21,371,569,000	*	*	*	\$2,916,000,000	*	*	18,455,569,000	
North Carolina	\$11,948,236,169	\$10,013,922,403	*	*	*	\$3,670,294,208	*	*	6,343,628,195	
North Dakota	\$1,488,269,587	\$1,313,121,620	\$16,196,458	*	*	\$451,314,958	*	*	861,806,663	
Ohio	\$10,792,599,430	\$8,564,997,267	\$25,190,546	\$15,817,547	0.18%	\$2,413,553,499	\$9,372,999	0.11%	6,151,463,768	
Oklahoma	\$4,285,356,782	\$3,471,909,065	\$138,892,618	*	0.00%	\$988,549,006	*	0.00%	2,483,360,059	

# STATE FUNDING MATRIX

State	Total Combined (Federal+State) Dollars Spent on Education	Total State Education Funding	Total State CTE Funding	\$ of State Postsecondary CTE Funds	% of State Educ. \$ Spent on Postsecondary CTE	Postsecondary State Expenditure	\$ of State Secondary CTE Funds	% of State Educ. \$ Spent on Secondary CTE	K-12 State Appropriations
Oregon	\$4,704,464,177	\$3,901,414,830	*	*	*	\$626,214,417	\$4,940,000	0.13%	3,275,200,413
Pennsylvania	\$9,219,176,856	\$6,865,411,000	\$65,000,000	*	*	\$1,335,332,000	*	*	5,530,079,000
Rhode Island	\$1,201,142,343	\$939,813,071	\$28,642,123	1,844,364	0.20%	\$162,652,548	\$26,797,759	2.85%	777,160,523
South Carolina	\$3,637,652,390	\$2,672,927,364	12,069,147	*	*	\$1,143,563,423	*	*	1,529,363,941
South Dakota	\$1,033,691,447	\$758,950,815	\$26,465,506	\$24,365,506	3.21%	\$218,395,097	2,100,000	1.59%	540,555,718
Tennessee	\$6,993,125,400	\$5,719,512,700	4,250,100	*	0.00%	\$1,581,668,600	*	0.00%	4,137,844,100
Texas	\$42,563,838,290	\$36,939,465,884	\$55,163,364	*	*	\$16,746,100,000	*	*	20,193,365,884
Utah	\$4,966,764,707	\$4,283,263,300	\$82,352,300	\$1,376,500	0.03%	1,562,335,000	80,975,800	1.89%	2,720,928,300
Vermont	\$1,507,829,715	\$1,347,782,794	\$14,068,162	\$360,000	0.03%	\$89,247,164	\$13,708,162	1.02%	1,258,535,630
Virginia	\$15,676,438,892	\$14,213,691,586	\$87,390,425	\$76,989,596	0.54%	\$8,068,053,916	\$10,400,829	0.07%	6,145,637,670
Washington	\$8,110,731,081	\$6,944,755,000	*	*	*	\$1,345,332,000	*	*	5,599,423,000
West Virginia	\$2,754,776,346	\$2,267,038,806	\$31,779,410	*	*	\$416,496,337	31,779,410	1.40%	1,850,542,469
Wisconsin	\$8,565,956,122	\$7,518,422,300	\$18,797,900	*	*	\$1,334,085,100	*	*	6,184,337,200
Wyoming	\$1,422,991,031	\$1,269,894,461	*	*	*	\$463,903,037	*	*	805,991,424
<b>Grand Totals:</b>	\$411,572,795,650	\$345,018,981,760	\$2,404,586,132						

Legend	Column 5/Column 3 = State Postsecondary CTE as a % of Total State Education Spending
Column 6: % of State Educ. \$ for Postsecondary CTE"	Column 8/Column 3 = State Secondary CTE Spending as a % of Total State Education Spending