



REPORT

JULY 2020



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CAREER AND TECHNICAL EDUCATION AND WORKFORCE DEVELOPMENT

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KEY TAKEAWAYS

- Missouri is lagging behind its neighbors in important economic indicators, in part because of low labor force participation rates.
- Career and technical education (CTE) can help high school students move into the workforce immediately after graduation, potentially boosting labor force participation.
- However, Missouri's CTE needs reform in order better align the instruction in CTE programs with the skills that local employers are looking for in job applicants.

ADVANCING LIBERTY WITH RESPONSIBILITY
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INTRODUCTION

For Missouri to have a strong economy and for its workforce to be prepared for the state's many open jobs, something will have to change. Missouri's economy is lagging behind those of other states, in part because young people are leaving school unprepared to enter the workforce. Career and technical education (CTE) can be an effective way to prepare the state's high schoolers for high-demand jobs across the state, but the current CTE programs are falling short. The struggles of these programs will be even more costly during the coronavirus pandemic, which has already caused significant increases in unemployment. Many students just graduating from high school, or who will graduate in the coming years, are expected to postpone college plans because of financial difficulties and/or safety concerns. How well these students can adapt to their new and unexpected circumstances will depend to some degree on what skills they learned in high school. Other states have promising CTE models that could serve as examples for efforts to improve CTE in Missouri.

MISSOURI'S ECONOMY

Missouri's economy is falling behind those of its neighbors, according to a report from the Heartland Institute.¹ The report focused on America's Heartland region, which consists of 19 Midwestern and Southern states, from the Dakotas to Alabama. The report analyzed each state's economy over the period from 2010 to 2016 and compared it to others in the region using nine total outcome measures of the economy. Missouri places no higher than ninth in any of the growth measures and is lower in many of the metrics. Four indicators in particular—gross domestic product (GDP), standard of living, productivity, and wage growth—create a picture of the state's economy.

- GDP measures the worth of all the goods and services produced in the state. The Heartland Institute measured GDP growth in each state and found that Missouri had the third-lowest GDP growth in the region; from 2010 to 2016 Missouri had an annual growth rate of 0.8 percent. Comparatively, seven Heartland states had annual GDP growth rates of between 2.0 and 5.0 percent.²

- The standard of living measure is based on GDP per person and shows how much individuals partake in the goods, products and services produced by the economy. In 2016, Missouri had a standard of living of \$47,000, compared to an average of \$50,000 for the Heartland region and a non-Heartland average of \$57,000. Looking at change over time, Missouri had the third-lowest standard of living increase, with an annual increase of 0.5 percent from 2010 to 2016.³
- The productivity indicator quantifies the average amount each worker contributes to their state's economy with his skills and services. At \$104,000, Missouri's 2016 productivity rate was 14th among the 19 Heartland states and was lower than the national average. Illinois had the highest productivity rate among Heartland states at \$127,000. Similarly, Missouri had the second-lowest productivity change over time, with a 0.4 percent annual decline from 2010 to 2016.⁴
- Wage growth is another indicator in which Missouri is very near the bottom of the rankings. Between 2010 and 2016 Missouri had the third-lowest average annual wage growth (0.4 percent) and the third-lowest annual increase in median earnings (0.8 percent) of the region. Sixteen other states had faster-growing median earnings or wages than Missouri. Fourteen states had at least 1 percent annual growth, and three states had annual growth rates of over 1.7 percent.⁵

The overall condition of the state economy, combined with the slow growth of wages, is related to the condition of the workforce in the state.

Problems with the quality of a state's workforce can deter businesses from coming to, or staying in, the state. A 2019 analysis by Forbes found that Missouri ranked 37th in labor supply among all fifty states.⁶ Forbes used high school and college attainment from the Census Bureau and workforce representation by a union from the Bureau of Labor Statistics, as well as data on net migration, projected population growth, and the percentage of the population between ages 25 and 34 from the Bureau of Labor Statistics.⁷ A 2018 ranking from CNBC put Missouri even further behind, ranking it 41st in workforce quality and 25th in the economy.⁸ Cost of living and cost of doing

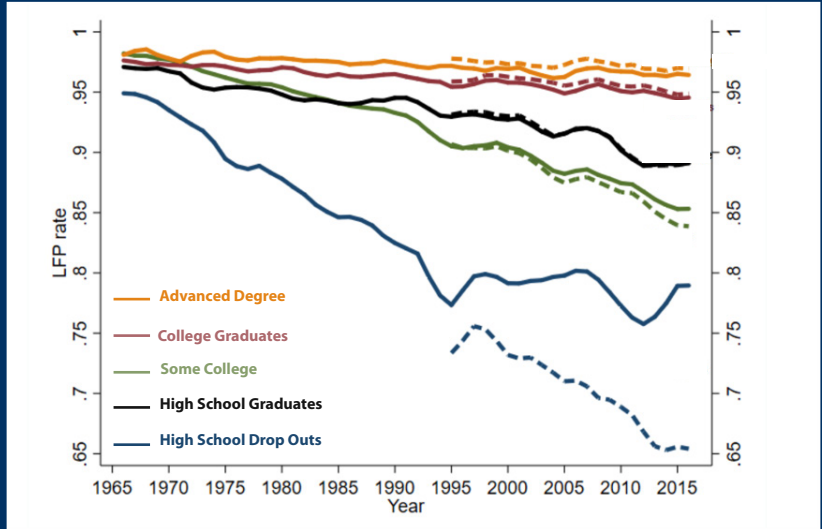
business ranked highly for Missouri, 6th and 8th respectively, so Missouri has appealing qualities that could encourage business growth if not offset by a poor workforce. The workforce rating included education, number of available employees and net migration of college-educated workers. The economy indicator included economic growth, job creation, spending and real estate market. Low rankings of the state’s workforce mean Missouri is building a reputation as a state where it may be difficult to operate a business because it’s challenging to find talent. From a national perspective, Missouri’s economy is not a front runner and has areas for improvement. The economy is partly dependent on the labor force, and information about Missouri’s labor force can help give the state direction on how to bolster the economy.

Labor Force Participation

The labor force participation rate is the percentage of working-age Missourians (excluding those who are in the military or are institutionalized) who are classified as being in the labor force because they are either looking for work or hold a job.⁹ After peaking in 1996 at 71.1 percent, Missouri’s labor force participation rate has been steadily declining and was at 64.1 percent at the end on 2019.¹⁰ For prime-age adults (those between 20 and 64 years old), the labor force participation rate is generally higher—the 2018 rate was 77.4 percent according to the Census Bureau.¹¹ While the unemployment rate is often used as a reference point to see what percentage of people are in or out of work, it fails to capture those who have completely dropped out of the workforce.

The decline in labor force participation among men has been more dramatic for some groups than for others. In a working paper for the National Bureau of Economic Research, Ariel J. Binder and John Bound examine the trends in labor force participation among men by education level nationwide. They found that attachment

**Figure 1:
Labor Force Participation Rates by
Education Status, Males Aged 25–54,
1965–2016**

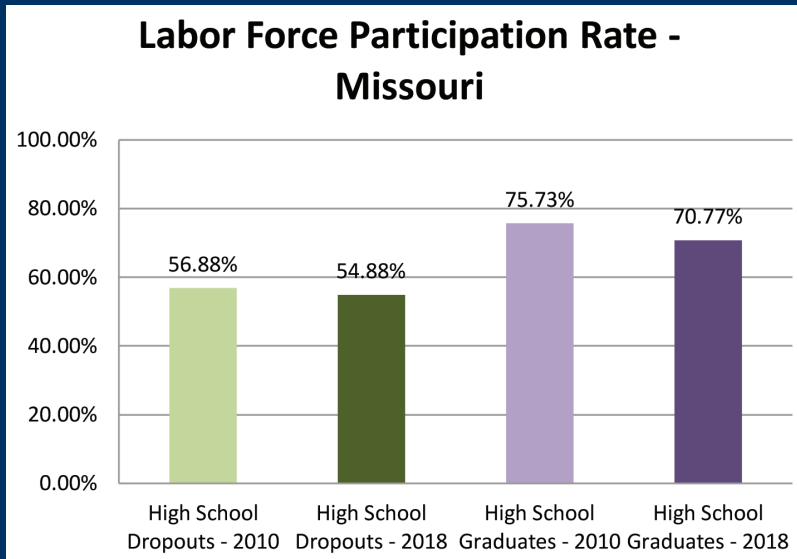


Source: Binder, Ariel and John Bound. *The Declining Labor Market Prospects of Less-Educated Men*. National Bureau of Economic Research. Working Paper 25577. February 2019 <https://www.nber.org/papers/w25577.pdf>. Authors’ calculations based on the March supplement to the Current Population Survey. Dotted lines exclude foreign born (the CPS begins tracking birthplace in 1994). Within each education status, a re-weighting procedure is employed to hold the age distribution constant across each year. Graph presents 3-year moving averages.

to the workforce (defined as working more than 13 weeks out of the year) is declining primarily among men who dropped out of high school or only received a high school diploma or its equivalent.¹²

They explain that “[i]n the late 1960s, nearly all 25–54-year-old men with only a high school degree participated in the labor force; by 2015, such men participated at a rate of 85.3 percent.” For all high-school dropouts, that figure was below 80 percent; but when excluding foreign-born immigrant men who dropped out of high school and counting only the high school dropouts born in the United States, labor force participation is even lower at about 65 percent. Meanwhile, nearly 90 percent of men with some college education but no college degree were in the workforce in 2015.¹³ Figure 1 illustrates the decline among American-born high-school dropout men.¹⁴

Figure 2:
Labor Force Participation Rate: Missouri



Source: American Community Survey, Table B23006. Educational Attainment by Employment Status for the Population 25 to 64 years, 2018; ACS 1-Year Estimates Detailed Tables and 2010: ACS 1-Year Estimates Detailed Tables. <https://data.census.gov/cedsci/table?q=labor%20force%20participation%20by%20education&hidePreview=true&tid=ACSDT1Y2018.B23006&t=Educational&vintage=2018&tp=true&moe=false&y=2018&g=0400000US29>.

This disparity in workforce participation between education levels is also apparent in Missouri. For men and women with some college or more ages 25 to 64 years old, the labor force participation rate has remained steady starting at 79.3 percent or higher.¹⁵ On the other hand, in 2010, 56.88 percent of high school dropouts and 75.73 percent of high school graduates were in the labor force.¹⁶ By 2018, however, only 54.88 percent of high school dropouts and 70.77 percent of high school graduates of the same age group were attached to the workforce.¹⁷ Compared to 2010, fewer high school dropouts and high school graduates were participating in the workforce in 2018. Overall, over one-quarter of prime working age adults are not working or even looking for a job. Figure 2 shows the decline in high school graduates and dropouts from 2010 to 2018.

Condition of Missouri's Workforce

The high number of people out of the workforce is not necessarily due to a lack of opportunities. In fact, there is a shortage of workers for “middle-skill” jobs—those requiring more than just a high school diploma but not necessarily a four-year college degree. According to the National Skills Coalition, middle-skill jobs made up 53 percent of Missouri’s labor market but only 46 percent of workers met that skill level in 2015.¹⁸ While labor force participation rate data show what populations of people are more involved with the workforce, a closer look at the condition of the workforce in Missouri shows which skills are in short supply.

The Forbes and CNBC rankings suggest that the workforce is an important aspect that businesses consider as they choose where to locate. According to the Missouri Chamber of Commerce, employers in the state suffer from a skills shortage.¹⁹ Similarly, in a Gallup poll of Missouri companies, one CEO stated that “we cannot find enough workers with the right skills. There is a mismatch, and unless

somebody does something soon, we won’t be able to grow in Missouri.”²⁰ An HR director interviewed in the survey stated, “It’s real. If you don’t believe the skills gap is real, all you have to do is sit in my chair for a week. You would never doubt it again.”²¹ In this poll, more than 90 percent of Missouri employers agreed it is necessary to take action to develop a strong workforce, but they aren’t optimistic. Only 30 percent of Missouri employers agreed the state is able attract or retain top talent.²² Businesses need skilled applicants, and they might need to relocate if Missouri cannot supply them.

The Missouri Economic Research and Information Center (MERIC) predicts that by 2024, there will be relatively high job growth in healthcare, computer systems, elementary and secondary schools, family services, building support, construction services and even more industries in the state.²³ Growing industries

will face challenges recruiting and hiring if the quality of Missouri's workforce does not improve. MERIC estimates there will be more than 307,000 job openings for middle-skill jobs in Missouri between 2014 and 2024.²⁴ Some of these openings are lower-paying jobs, paying between \$23,000 and \$25,000 annually, such as nursing assistants and teacher assistants. But these occupations will have thousands of openings. Other occupations, including maintenance workers and trailer truck drivers, pay on average over \$35,000 annually and will also have thousands of positions available.²⁵ MERIC expects that between 2014 and 2024, nearly a quarter of all job openings will be from new jobs in industries that are expected to expand (76 percent of openings are projected to result from retirement, turnover, or career changes).²⁶

Middle-skill jobs are those that require some experience beyond a high school diploma but that don't require a four-year degree. Types of experience that could bump someone up into the middle-skills tier include apprenticeships, certificates, certifications, licenses, and some college or an associate's degree.²⁷ The four occupations projected to grow the most between 2014 and 2024—occupational therapy assistants, physical therapist assistants, millwrights, and web developers—all pay over \$50,000 on average and are middle-skill jobs.²⁸ Moreover, there are more job openings in the health care, business, and technology industries than job seekers in Missouri. Many of these openings are for lower-skill jobs but give individuals opportunities to move up through education and training.²⁹

Demand for middle-skill jobs is expected to grow through 2024.³⁰ Out of all the "good jobs" nationwide (defined as a salary of at least \$35,000 for workers 25 to 44 and at least \$45,000 for workers 45 to 64 according to Georgetown University's Center on Education and the Workforce), 24 percent are middle-skill jobs.³¹ Nearly half of all middle-skill jobs are good jobs, compared to just 32 percent of jobs requiring only a high school degree.³²

The combination of declining workforce participation and the growing gap between job openings and the supply of qualified workers presents a problem for Missouri. Improving CTE for high schoolers may help address both aspects. This does not mean policymakers should ignore older adults who are out of the workforce, but special attention should be paid to the secondary level of

education. Keeping students in school and connected to the workforce through an effective system of CTE will be more efficient than retraining workers in the future.

STATE OF CAREER AND TECHNICAL EDUCATION IN MISSOURI

CTE Certificate

CTE in Missouri is structured so that when students are interested in pursuing a career, they progress through different stages of the CTE process and can eventually earn a CTE certificate. A CTE certificate is a fairly new option for students, as it was first initiated in the 2017–18 school year.³³ It is earned alongside a high school diploma, so students can cease CTE participation at any time and still earn a high school diploma as long as they meet high school graduation requirements. In order to earn a CTE certificate, students must first create an Individual Career and Academic Plan. DESE states that students should create a plan no later than eighth grade, but the plan can be reviewed regularly so students can adjust it.³⁴ Students' plans will consist of the classes in their areas of interest and high school graduation requirements and will include any other postsecondary preparation students intend to complete [CTE certificate, industry-recognized credentials (IRC), technical skill assessments (TSA) and others]. The plans will guide students throughout class registration in high school and will be used to establish each student's CTE course sequence.

After a student has completed at least three CTE courses in her sequence and provided that she earns at least a 3.0 grade-point average, she is considered a CTE concentrator. She must then:

- Fulfill a skills-testing requirement, either with a TSA or an IRC, related to her concentration.
- Complete at least 50 hours of a "work-based learning experience," which can include internships, job shadowing, a registered apprenticeship, or another option.³⁵
- Have at least a 95 percent attendance rate during high school.
- "Demonstrate attainment of employability skills/business skills," (which can be done through student organization participation, passing an

employability or ethics exam, or obtaining three or more letters of recommendation).³⁶

- Score at or above the state standard on an exam such as the ACT or SAT.

Funding

CTE funding made up about 1.5 percent of DESE's general revenue fund in FY2020.³⁷ Between fiscal years 2019 and 2020, spending on secondary CTE largely remained the same in Missouri. This included vocational education, the Career Awareness Program and the Computer Science Education fund. The Missouri General Assembly allocated \$50.1M to Missouri's Department of Elementary and Secondary Education (DESE) for vocational education (excluding advertising) from general revenue funds and an additional \$22M for vocational education providers from federal funds for FY2020, the same amounts as in FY2019.³⁸ Previously, \$250,000 was allocated to the STEM Awareness Program, but these funds were transferred to the new Career Awareness Program for FY 2020.³⁹ There was another new fund created, the Computer Science Education Fund, to which \$450,000 was allocated.⁴⁰ DESE also distributed just under \$4 million to postsecondary CTE programs and \$4.2 million to adult CTE programs in FY2020.⁴¹

DESE distributes funds for vocational education to Area Career Centers (ACCs) and comprehensive high schools. In order to receive any funding, secondary and postsecondary programs must comply with DESE's Common Criteria and Quality Indicators rubric and submit a program improvement plan. Once the rubric and plan are completed, funding varies slightly between ACCs and comprehensive high schools. For an ACC, funding partially depends on career education time devoted (CTD), counted as the hours that properly certified teachers spend teaching DESE-approved CTE courses. DESE will multiply the total CTD hours for each district by \$2,500. The other factor is credits earned. DESE calculates what percentage of CTE credits earned in the state were earned at the ACC; that number becomes the percentage of the CTE funding the ACC will receive. ACCs also receive a base funding amount of \$75,000.

Comprehensive high schools receive CTD funding in a similar fashion as ACCs. But whereas DESE calculates the percentage of credits earned for ACCs to determine CTE funding, DESE calculates what percentage of CTD

in the state were accumulated at a single high school to determine CTE funding. DESE's goal is to contribute at least \$2,500 toward a school's CTE funding for each full-time employed CTE teacher.⁴² This could change based on what schools qualify for. Adult and postsecondary CTE programs receive funding based off program calculations, like ACCs and comprehensive high schools. ACCs and comprehensive high schools are eligible for performance funding based on student placement. A student is counted as "placed" when he completes a program and continues his education in a related field, is employed in a related field, or enlists in the military. DESE calculates the percentage of placements out of all the "completers" in the state (a completer being defined as someone who is a CTE concentrator and who graduates high school). The percentage of completers who are placed determines the percentage of performance funding the ACC or comprehensive high school receives. CTE enhancement grants provide funding to programs that have an emphasis on high-demand occupations.⁴³

The main federal CTE legislation, The Strengthening Career and Technical Education for the 21st Century Act (Perkins V) authorized federal funding for CTE programs.⁴⁴ Perkins Secondary Grants provided an additional \$16.2M to Missouri schools for FY2020.⁴⁵ DESE states that the Perkins funds are first granted to DESE, which distributes funds to a fiscal agent, which in turn distributes money to the consortium member.⁴⁶ Consortia are made up of one or more districts (possibly including higher education institutions) that share an area career center (ACC) and are used when DESE is determining funding. Schools within consortia can receive widely different amounts.⁴⁷ Perkins money is for secondary and postsecondary programs. DESE allocates 72 percent of the Perkins money to secondary CTE, and 28 percent goes toward postsecondary CTE. Of the secondary CTE funds, 30 percent are awarded based on the percentage of the state's K-12 students in the district and the remaining 70 percent are awarded based on the percentage of the state's K-12 students below the federal poverty line in the district.⁴⁸

Participation

High schoolers in Missouri access CTE at one of the 444 traditional (also called comprehensive) high schools or at one of 55 ACCs.⁴⁹ ACCs offer CTE courses to students from surrounding schools, and these students can attend

the ACC for whole or half days. For instance, if a student is interested in computer software classes but his high school doesn't have them, he could go to the ACC for half of his school day to take the classes and then return to his traditional high school for his remaining courses. During the 2018–19 school year, 126,843 students enrolled in CTE courses and 27,983 students had concentrated (taken three courses in one career area).⁵⁰

Most students take CTE courses at their traditional high school or part time at an ACC. In fact, in the 2018–19 school year, Missouri vocational high schools enrolled just 2,850 full-time students, which would be about 1 percent of all high school students.⁵¹ From these numbers, ACCs may appear to be underused, but in addition to part-time students many CTE course-takers may take courses at their comprehensive high school as part of a general plan of study that happens to qualify as a CTE course. For example, a personal finance course is required for high school graduation, but it can also qualify as a CTE course.⁵² Demographically, 46 percent of CTE concentrators in 2019 were female and 54 percent were male; 79 percent were white, 11 percent were Black, 5 percent were Hispanic, and less than 5 percent were of another race. Forty percent of CTE concentrators were economically disadvantaged.⁵³

Accessibility

Schools make various CTE courses available based on teacher availability, teacher expertise, program resources, and student demand. Some courses offered in one district, or even a consortium, may not be available in another. Looking at the number of student concentrators in the 2018–19 school year (Table 1), it is unclear whether low student participation in some clusters is due to low supply of classes or simply a low level of student interest. Both of

**Table 1:
The Number of Missouri Secondary Students in Each Career Cluster Concentration 2018–19**

Career Cluster	Number of Student Concentrators
1-Agriculture, Food & Natural Resources	5,527
2-Architecture & Construction	1,510
3-Arts, Audio/Video Technology & Communications	656
4-Business, Management & Administration	2,262
5-Education & Training	476
6-Finance	379
7-Government & Public Administration	0
8-Health Science	4,320
9-Hospitality & Tourism	1,749
10-Human Services	1,991
11-Information Technology	1,823
12-Law, Public Safety, Corrections & Safety	600
13-Manufacturing	1,560
14-Marketing, Sales & Service	1,027
15-Science, Technology Engineering & Math	2,069
16-Transportation, Distribution & Logistics	2,034

Source: Missouri Department of Elementary and Secondary Education. Secondary Concentrator Report within Career Clusters. Accessed June 1, 2020 at <https://apps.dese.mo.gov/MCDS/home.aspx?categoryid=14&view=2>.

these factors affect the course offerings in districts. ACCs can be a strategic way to provide students with specialized courses, but ACCs might not always offer the CTE classes that comprehensive high schools lack. To illustrate differences between districts, the Wentzville R-IV School District had one of the highest numbers of students, 68, concentrating in information technology (IT) in 2017–18. The IT concentration requires at least three classes to be available to students in the subject matter. Elsewhere

in the state, however, 230 districts had zero students concentrating in IT the same year.

Outcomes

There are different ways to measure the outcomes of students who participate in CTE. One way is through the certificates and tests that students pass after completing their programs. Technical skills assessments (TSAs) and industry-recognized credential (IRCs) examinations are two such tests. A TSA is a test administered by the state to measure students' proficiency in their area of concentration.⁵⁴ During the 2018–19 school year, 12,910 students took a TSA and 9,626 passed, for a passing rate of 74.5 percent.⁵⁵ On the other hand, IRCs are awarded by third-party industry organizations and recognize students' competency for a specific job or occupational area; students do not have to concentrate to earn an IRC.⁵⁶ For 2018–2019, 8,920 IRCs were earned by students.⁵⁷ Overall, that's a small percentage of high school students earning a TSA or IRC, roughly 3 percent of high schoolers for each.

Other outcome measures include the percentage of CTE students who graduate from high school and what CTE students pursue after high school. In 2019, 96.7 percent

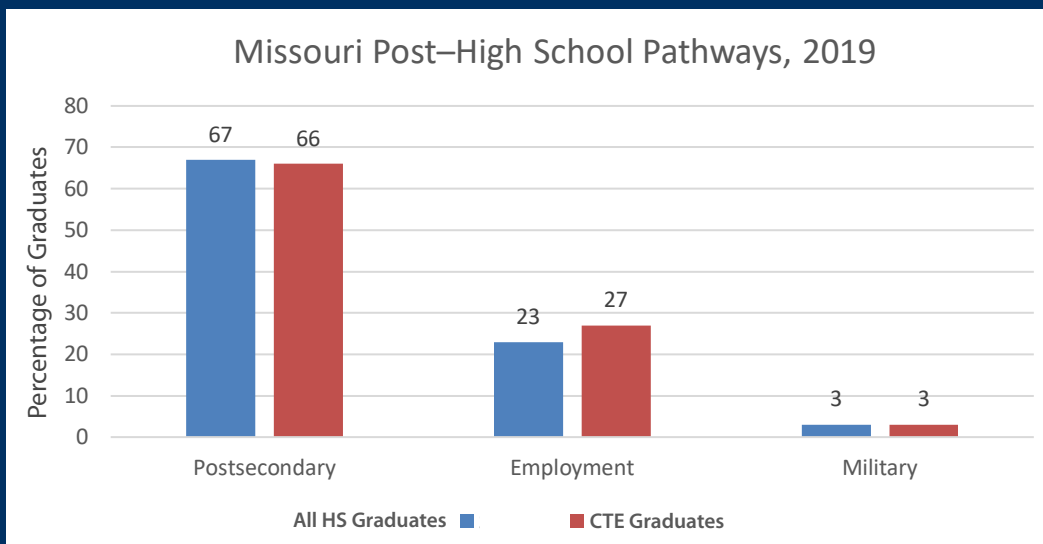
of CTE concentrators graduated from high school in four years (89 percent of all Missouri students graduated high school in four years).⁵⁸ DESE also tracks what CTE concentrators pursue after graduation: postsecondary education, employment, or the military. In 2019, 66 percent of the CTE concentrators went into postsecondary education, 27 went into employment, and 3 percent went into the military (Figure 3).⁵⁹ The only difference between CTE concentrators and all high school graduates is that CTE concentrators enter employment at a rate 4 percent higher than all Missouri high school graduates. It may be that the benefits of the CTE courses manifest in other ways, such as entering a high-paying field or doing well in college courses. However, limited Missouri-specific data make it challenging to see what outcomes result from being a CTE concentrator or a CTE certificate holder. There are, however, nationwide data that point to the promise of CTE programs in preparing students for success after high school, discussed later in this report.

Research on Strong CTE Programs

Research on successful CTE programs can help guide Missouri policymakers by providing insight about what types of models and program attributes might be best

suiting to our state. But first, program developers should have a clear vision of what CTE should be. Brent Orrell, a resident fellow at the American Enterprise Institute, described workplace training as an “extension of the market” and the programs in it as “industry-focused worker training programs rather than social services programs with work as an add-on activity.”⁶⁰ CTE should make

Figure 3:
Post-High School Pathways for Missouri Graduates



Source: MCDS Data Portal, *College & Career Education: 5S1 Secondary Student Placement*. The Department of Elementary and Secondary Education. <https://apps.dese.mo.gov/MCDS/home.aspx?categoryid=14&view=2>.

high school education more responsive to the needs of the economy. This is important to establish because traditionally, CTE has a stigma of being a second-tier offering in a high school curriculum focused on preparing students for college.⁶¹ But a strong CTE program can provide students with valuable skills and job training. Drawing on different CTE research, a policy brief from the Johns Hopkins Institute states that:

“At their best, CTE programs should contain the following four anchors:

- Student cohort-themed course sequences;
- Rigorous, college-preparatory academics;
- Opportunities to earn college credits and industry-recognized credentials or certificates; and
- Work-based learning opportunities such as internships.”⁶²

It should also be noted that CTE programs across each state—and even across regions, districts, and schools—may vary dramatically. This could depend on the local economy and regional workforce needs, as well as the staff and leadership at a school. Not everything from CTE research in other states will translate well into Missouri, but the themes and lessons from the research should offer guidance for how Missouri should pursue CTE reform.

Research on Student Outcomes

Research on student outcomes after CTE program participation shows how the courses and training can benefit students and the state. There is, however, limited evidence on which specific aspects of a program can change the trajectory of student outcomes.⁶³ Outcomes can be reflected in high school graduation rates, educational attainment, or earnings. Of course, the nature and quality of the CTE program will influence how strong its effect will be.⁶⁴ One study found that students experience a wage increase after they have completed upper-level vocational education courses, but that introductory courses didn’t affect earnings.⁶⁵ A study from the University of California–Santa Barbara found that when students take CTE courses later in high school they are more likely to graduate on time and less likely to drop out of school, but the study found little evidence that CTE increases college enrollment. The authors of

the study specifically state that for students who are at risk of dropping out, classes that connect with concrete experiences outside of school may help students persist through high school.⁶⁶

Three influential studies around CTE student outcomes have shown positive effects from CTE participation in specific programs.⁶⁷ Shaun Dougherty of Vanderbilt University studied Massachusetts’s regional career and technical education schools in 2015. Massachusetts has 36 regional vocational and technical high schools (RVTs), 27 of which are run semi-independently of the traditional school districts and are schools of choice where all students participate in some CTE program.⁶⁸ According to a 2015 study from the Pioneer Institute, there were about 5,000 more applicants than seats for RVTs.⁶⁹ RVTs have been particularly successful in educating lower-income students. Dougherty found that low-income students were about 32 percentage points more likely to graduate on time and 13 percentage points more likely to earn an IRC if they attended an RVT compared to their traditional high school peers.⁷⁰

James Kemple’s 2008 study looked at Career Academies from nine urban districts around the county. The academies are “organized as small learning communities, combine academic and technical curricula around a career theme, and establish partnerships with local employers to provide work-based learning opportunities.”⁷¹ Kemple found that students in Career Academies experienced earnings of around 11 percent more per year than non-Career Academy students, and that the effects were concentrated among the men in the groups.⁷² A 2018 study by Steven Hemelt, Matthew Lenard, and College Paepflow followed up on the Career Academies in Wake County Public School System in North Carolina and also found that Career Academy students had higher graduation rates and were more likely to earn an IT industry certification. In addition, male students experienced higher college enrollment rates than their peers.⁷³

Descriptive data from the U.S. Department of Education indicate that nationwide, high school CTE concentrators graduate by their expected graduation date at a rate of 94 percent, while non-CTE concentrators graduated at a rate of 86 percent. The U.S. Department of Education used longitudinal data from 10th-grade students from the

2001–02 school year to find that there was no difference in postsecondary credentials earned between concentrators and non-concentrators, but there was a difference in employment. Sixty-seven percent of non-CTE concentrators were employed full-time, whereas 72 percent of CTE concentrators were employed full-time eight years after expected high school graduation.⁷⁴

There is evidence that strong CTE programs help boost student achievement in the realms of high school persistence, workforce preparedness, and employment earnings. As for the studies that look in-depth at specific programs (Dougherty on Massachusetts, Kemple and Hemelt on Career Academies) it must be understood that those results were derived from programs each with their own specific requirements. For example, Massachusetts RVTs students alternate weeks in technical classes and core classes but career academy students are in their program full-time. Simply importing a plan like this from another state won't guarantee the same results in Missouri, but emulating some aspects of the program and customizing it to fit our state's needs could improve CTE in Missouri.

Changes for Missouri's CTE Programs

Research and examples from CTE programs in other states and school districts can provide insight into successful models and ways Missouri can improve its own CTE. One important aspect of successful models is providing CTE programming in autonomous schools of choice so that schools can make adjustments necessary for career-focused programs. CTE programming should also have input from local employers and be in touch with regional workforce needs so student experiences and skills from their schooling will match what employers are looking for. Another area in which other states are ahead of Missouri is ease of access to information for students about career and education opportunities so that they can take advantage of CTE.

Autonomous Schools of Choice

CTE-focused schools of choice would provide students with an effective model of CTE instruction delivery. This would require changing Missouri's current comprehensive high school/area career center model into something that resembles Massachusetts' RVTs or New Jersey's county vocational academics. Currently, comprehensive high

schools operate under the same rules and regulations as traditional high schools even though they offer CTE, and area career centers are treated like a supplement to comprehensive high school offerings. The closest option to RVTs or county schools in Missouri is through the Special School District of St. Louis, which has two different CTE high schools, North and South Technical School. A full-time schedule is only offered at North Technical High School.⁷⁵ Obviously, two high schools are insufficient to serve students all over the state. Autonomous CTE schools of choice, like RVTs or county vocational schools, are structured so that students from surrounding schools and districts can access comprehensive CTE programming.

Unlike students who may take CTE courses in a comprehensive high school, students in Massachusetts' RVTs receive instruction by alternating weeks between classrooms and technical shops. These schools offer a variety of career pathways to study, including automotive technology, programming and web development, and cosmetology. As previously mentioned, there are 36 RVTs in Massachusetts, 27 of which are run semi-independently. If Missouri were to adopt a similar model, it is reasonable to expect that the state would reap benefits similar to those experienced in Massachusetts.

In New Jersey students attend county vocational academics full time, and each school has its own admissions requirements, including attendance and grades in middle school. Because of their selective admissions criteria, county vocational academics may reject academically weaker students, which can skew their performance data. Nevertheless, these schools do give their students, including students from low-income families and those with disabilities, a head start on the career pathway of their choice and benefit the local economies by producing well-prepared graduates who can fill in-demand jobs. Certain characteristics from New Jersey's county vocational schools could guide Missouri in developing its own autonomous, CTE schools of choice. There are two distinguishing aspects of New Jersey's county vocational schools: their governing structure, and the partnerships they enjoy with local community colleges.

The way New Jersey's county vocational schools are structured and governed helps them fill the workforce needs of their counties. Each county has its own board of

vocational education (separate from the traditional state and local boards of education). Members of the vocational education boards must be county residents for at least three years and are appointed by the county's elected leaders. While some may think a system of county-level boards operating independently of the traditional school districts is unnecessary, this model gives them important autonomy in hiring teachers.⁷⁶ The county vocational schools have separate union contracts with teachers so they can customize their pay scale to fit their staffing needs—something that is more complicated or impossible with traditional districts' contracts with teachers' unions. If vocational high schools are going to effectively serve their students by helping them graduate with the skills they need to succeed, they must be able to appeal to highly-qualified instructors by offering salaries that are competitive with the private sector.⁷⁷

The second benefit is the county vocational schools have close partnerships with, and often are in close proximity to, the counties' community colleges. The vocational schools and community colleges can therefore share facilities and resources, making it more feasible for counties to offer more specialized programs. Moreover, this arrangement allows high school students and adults to access these programs and gives these communities a potentially higher return on their investment.⁷⁸ In addition, while many high schools now offer students the opportunity to earn college credit, making sure these credits will transfer is more straightforward for New Jersey's vocational schools because of their direct collaboration with the community colleges. The vocational schools and community colleges can also collaborate to create courses of study that allow students to earn an associate's degree at the same time as they earn their high school diploma.⁷⁹ With middle-skill jobs—those that require some college but not a four-year degree—in such high demand in Missouri, this model could be particularly attractive to students and employers.

Since these schools are highly responsive to the needs of employers in the area and shape their programs accordingly, students can be confident when they graduate that they will have skills for jobs in high demand if they decide to not go to college. And when demand for certain skills declines, the schools can respond by shifting resources accordingly—as occurred when the

Gloucester County Institute of Technology discontinued its horticulture program because jobs in that field were not in high enough demand to justify the program.⁸⁰

In the area of admissions policy, however, Missouri should consider carefully how closely it follows the lead of other states. In both Massachusetts and New Jersey, the schools have selective admissions and students must meet certain grade and attendance requirements in middle school to apply. While the schools are free public schools, these selective admissions policies can affect the demographics and performance of the schools and make the schools similar to magnet schools, which already exist in Missouri. A selective admissions process may be biased against low-income students, although it should be mentioned that the RVTSS studied in Massachusetts had a larger proportion of low-income students than comprehensive high schools. In any case if Missouri did pursue this model for CTE, policymakers could adjust the admissions guidelines to level the playing field if necessary.

Employer Involvement and Workforce Alignment

A 2019 report from ExcelinEd titled “Credentials Matter,” took a close look at what credentials are in demand and which ones Missouri students earned. According to the report, Missouri is a “low-alignment” state, meaning that in-demand, well-paying jobs do not align with our CTE programs.⁸¹ While no states were highly aligned, Oklahoma, Texas, Indiana, Tennessee, Kentucky and Florida are moderately aligned. Missouri has to make improvements in its CTE programs through data analysis and industry relations so that when students graduate high school with CTE training, they are prepared for high-demand jobs.

While it's difficult to say exactly how many districts have partnerships with local employers, Missouri survey data show that businesses see room for growth in district partnerships. A survey conducted by the University of Missouri for the CTE Advisory Council found that businesses leaders in Missouri see ways they could be involved with CTE, but that opportunities do not always translate into action.⁸² The survey also found that more than 90 percent of business leaders agree “that local employers should partner with schools to provide students with real-world education and training experiences,”

even though the researchers went on to state that “barely 50 percent of businesses indicate they currently have a working relationship with a CTE career center or CTE program.”⁸³

Extensive data and analysis from MERIC on state and regional workforce needs could be a starting point for districts or schools to identify ways to better prepare students. MERIC offers resources for different regions of the state, tailored to their specific workforce needs and projections. Aligning CTE with regional and statewide industry needs will also require working with regional industries and businesses so that schools have a direct connection to the workforce and students can also get industry experience.

North Carolina’s State Board of Education published best practices for district and business partnerships and provides some examples of successful partnerships and outcomes.⁸⁴ Different districts may have different relationships with businesses depending on CTE course offerings and local workforce needs, but they should all be grounded in clear communication and expectations for the businesses and for the district. One example of how a school district, Beaufort County Schools in North Carolina, worked with local industries is through their workforce development partnership. The purpose is to expose students to different types of jobs and connect students to internship and job opportunities. One employer, Carver Machine Works, asked for pre-selected students to apply to open positions, and three were immediately hired. Hired students even had a chance to attend community college classes paid for by the company. The partnership also features an internship program that offers students a 3-week internship in different occupations.⁸⁵

Another partnership between two districts and the private sector provides teachers with the opportunity to experience a new job field over the summer to help their students. In this program, teachers spend one week in temporary employment during the summer in a local business and then teach their students about their experience and set up site visits or talks for the students to learn about the job.⁸⁶

One more example is between the Winston Salem Forsyth County Schools and the Construction Industry Council of Winston Salem and the North Carolina Department of

Transportation. The Department of Transportation and Construction Industry Council set up a Construction Career Days event for high schoolers. Students can learn about earnings potential and growth opportunities in construction jobs. In some cases, students even get the opportunity to operate machinery or experience the job through hands-on exhibits and competitions.⁸⁷ Students learn about career opportunities and speak to people who work in the field about what the job is like. This can help districts stay in tune with industry needs and cultivate relationships with industry leaders so that the CTE programming can become more effective.

These are not the only ways that districts or schools can pursue relationships with local businesses but are some examples. Missouri school districts can get creative with industry involvement so that they can adjust their course offerings and allow for more hands-on experiences for students.

Ease of Access to Information

CTE programs often struggle with a perception that career-focused programs are for students who are not willing or able to enroll in college. Not only is that often incorrect, but a proper CTE program would be just as rigorous as a college-focused education. A survey conducted by the University of Missouri found that there was a lack of awareness, generally among non-CTE students, of the education and earning opportunities from CTE. Furthermore, parents are often already aware of CTE in general, but unaware of the credentials, programs, and opportunities it can include.⁸⁸ One way to combat this and to potentially recruit more students into CTE is by publicizing information about CTE opportunities and career prospects. Currently, DESE does not provide much information about job prospects or make it simple to navigate its website to find more information. Students must rely on their district websites to find program information and even information about high-demand fields.

MERIC provides thorough data on occupation projections and desired skills in certain fields.⁸⁹ MERIC is the research division of the state’s Missouri Department of Higher Education and Workforce Development.⁹⁰ DESE isn’t a research division like MERIC, so DESE wouldn’t necessarily have to create new materials; it

could simply make existing material more prominently available. For example, MERIC has posted labor market summaries for January 2020 for the state and different regions in the state listing the biggest employers, average wages for high-demand jobs, and a breakdown of the employment industries.⁹¹ This could help students see what opportunities are available in different areas or what jobs are in high demand in their area. The MERIC Target Industry Career Pathways provide information broken out by industry, specify the education and training required for different jobs, and provides information about average salaries in various fields. It also lists jobs by educational level. For example, the Financial and Professional Services Sector document lists that someone could qualify for a job as a financial clerk with an entry wage of \$31,290 if she has a certificate and receives short-term on the job training. It also lists job prospects in the sector for people with an Associate's degree and also those with a Bachelor's degree.⁹² Comparatively, the "Where the Jobs Are" link on a DESE page appears not to work since it directs to an inactive webpage.⁹³ The two links in the "information resources" category on DESE's Career Clusters page link to a vague one-page flyer or another flier explaining what occupation falls in each career cluster.⁹⁴ Compared to those, the MERIC resources provide more useful information to students, such as whether an occupation they are considering is currently hiring and where, and what the current wages are. One disadvantage of the MERIC information is that the main webpage is not geared toward potential CTE students, so DESE would have to pick out resources and relocate them to its own website.

These resources could help inform students about their career options with CTE and help them pick an effective education plan to prepare for their career. Students could then create a strategic course sequence and earn the appropriate credentials along the way. Creating a one-stop website with information on CTE would provide students with a thorough and informative resource for career planning.

CONCLUSION

Missouri needs to find a way to boost its economy and prepare workers for high-demand well-paying jobs. Without any changes, the economy is going to continue

to sink below that of its neighbors and Missouri will be an unappealing state to locate a business. CTE can provide high school students with the proper job skills so that they are ready to enter the workforce after graduation. But in order to have effective CTE, Missouri should have autonomous CTE schools of choice, work closely with local employers and businesses, and ensure people can easily access career information. The state needs prepared and qualified workers, and reforming CTE needs to be a priority so that students can fill good jobs.

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