



CAREER AND TECHNICAL EDUCATION IN MICHIGAN: ACCESS AND PARTICIPATION

KEY FINDINGS:



YOUTH POLICY LAB
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GEORGIA POLICY LABS

1. Approximately half of all Michigan students enroll in at least one CTE course during high school. Business, marketing, and health sciences are the most popular programs.
2. Female, Black, Hispanic, and economically disadvantaged students are less likely to participate in CTE. These differences are smaller among students who attend the same high school, suggesting disparities in opportunity rather than student demand drive statewide participation gaps.
3. More than 500,000 skilled trades jobs are expected to become available in Michigan through 2026, primarily in construction, manufacturing, healthcare, automotive technology, and information technology. While many CTE programs align with these high-demand fields, some exhibit low participation and completion rates.

INTRODUCTION

Despite record low unemployment and continued economic expansion in the U.S., economic insecurity remains pervasive throughout the population. Nearly 40 million Americans live in poverty and more than 8% of workers hold multiple jobs to make ends meet.ⁱⁱⁱ Facing these prospects, the path to economic security is unclear for many young people – especially those from disadvantaged backgrounds. Recent estimates indicate that a child born into the bottom fifth of the income distribution has just a 7.5% chance of reaching the top fifth in adulthood.^{iii,iv}

While the idea of sending every student to college once enjoyed broad support as a means of combating these trends, the limits of this approach have become apparent. Approximately 40% of students who start college never obtain a degree. The statistics are even worse for low-income students, a mere 16% of whom ultimately graduate.^{v,vi} Moreover, the share of student borrowers with more than \$50,000 of debt increased from 2% in 1992 to 17% in 2014.^{vii} Those interested in providing future generations with pathways to economic security thus face a difficult challenge. At a time when poverty and inequality are becoming entrenched in society, postsecondary education is proving an unreliable solution for many.

In part as a result of these trends, high school career and technical education (CTE) programs have emerged as a popular strategy for improving young people's chances of finding – and keeping – stable jobs. Taught by former industry professionals and structured around hands-on projects, CTE aims to equip students with knowledge and skills to thrive in the workforce.

Given its potential to strengthen talent pipelines without requiring students to take on excessive debt, CTE has received bipartisan political support. Here in Michigan, both the Snyder (Republican) and Whitmer (Democrat) administrations have featured CTE in their plans to strengthen the state's workforce. Under former Governor Snyder's Marshall Plan for Talent, K-12 schools can receive grant funds by partnering with employers to develop or expand project-based curricula that lead to industry-recognized certificates (like those found in many CTE courses). In her first state budget recommendation, Governor Whitmer proposed changes to Michigan's school funding formula to increase CTE resources by \$50 million.^{viii}

Despite this wealth of attention, we know relatively little about the efficacy of CTE programs. Stakeholders like parents, students, state and local administrators all have a vested interest in better understanding the predictors and outcomes of CTE participation. This brief aims to begin that conversation by shedding light on access to and enrollment in Michigan's high school CTE programs.

“ Approximately 40% of students who start college never obtain a degree. ”



What is CTE?

High school CTE consists of coordinated course sequences, called Programs of Study, designed to prepare students to work in specific jobs. As of the 2018-19 school year, there were 52 state-recognized Programs of Study. All CTE programs in Michigan are organized around 16 federally recognized Career Clusters plus one in energy that the State petitioned to add. Although CTE is commonly conflated with traditional “vocational education” and therefore assumed to only involve the skilled trades, CTE actually encompasses a wide variety of fields. Programs range from auto collision repair to marketing to robotics. See the Appendix for a full list of programs and clusters.

Regardless of the Career Cluster in which they are housed, all programs share the common goal of fostering work readiness. Courses prioritize hands-on projects that mirror the workplace rather than the lecture format found in most traditional classrooms. They are taught by former industry professionals who must have 4,000 hours of recent and relevant work experience to receive teaching certification. As they progress through CTE programs, students are exposed to increasingly specialized content and may have the opportunity to earn industry-recognized credentials or college credit through their coursework. In some districts, students also have the opportunity to participate in internships and apprenticeships.

Programs of Study typically must cover 12 segments, which are groups of content standards set by the Michigan Department of Education Office of Career and Technical Education (MDE OCTE). An entire program’s worth of segments typically are distributed across three or four courses, which is modest relative to some other states. Students may stop a program at any point and are designated as participants, concentrators, or completers depending on how many segments they complete.

Relative to other aspects of education, local districts exercise a high degree of control over CTE operations. Michigan CTE programs are managed by a Career Education Planning District (CEPD), a group of geographically neighboring local educational districts. A CEPD administrator identifies the skills and programs needed in the region, and, in partnership with local schools, coordinates CTE program offerings across high schools and career academies. The CEPD administrator also creates new CTE programs and helps school districts improve existing programs.

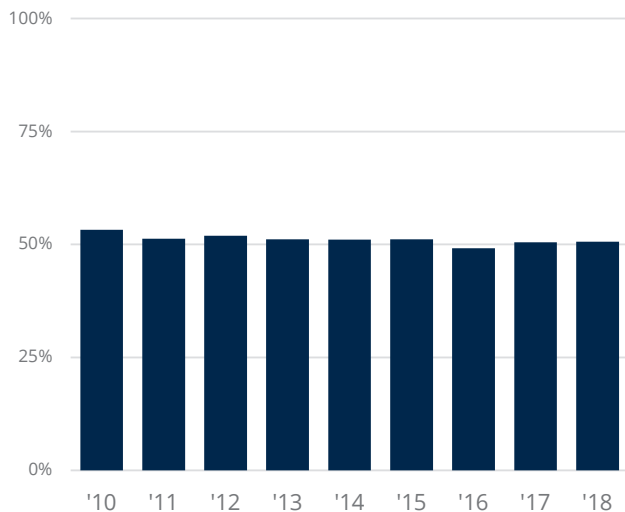
Most CTE courses are housed at local schools or standalone technical centers, though some dual-enrollment programs operate on college campuses. If a specific program is not offered at a student’s local school, students may have the option to enroll in the program in a different school, district, intermediate school district (ISD), or area CTE center. Receiving districts ultimately decide whether or not to enroll students from neighboring districts. Enrollment in an ISD-, center-, or consortia-based program, however, is based on cooperative agreements among districts and ISDs.^{ix} Districts provide busing for students who must travel to participate in a program.



How Popular is CTE?

Analyzing data from nine recent expected graduating classes (meaning an entering high school class identified by the year they were expected to graduate), we find that CTE is a common part of Michigan students' high school experiences. Approximately half of each cohort has participated in at least one CTE course.

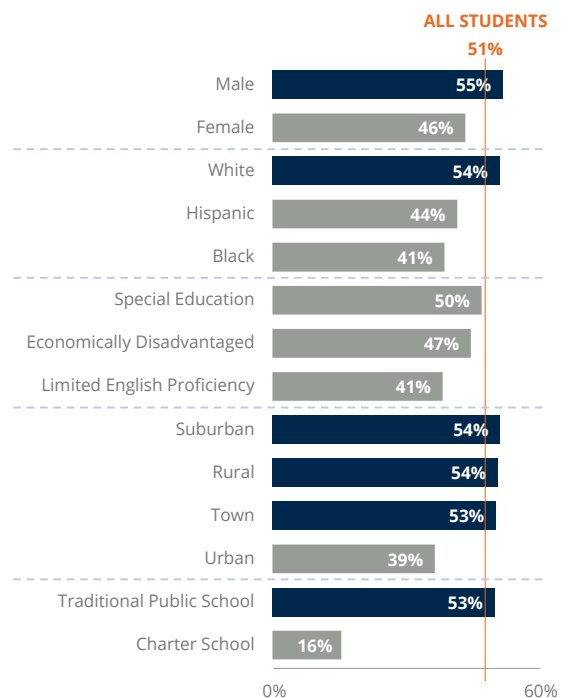
Figure 1: Roughly half of each expected graduating class participates in CTE during high school



While these data provide a broad overview of CTE enrollment in Michigan, we need to dig further to assess how participation compares across groups and communities. This is a relevant topic given current debates over CTE. Advocates claim that along with providing students valuable hard and soft skills directly relevant to the labor market, CTE can also motivate students to pursue additional education, either by completing high school or enrolling in specific postsecondary programs. Conversely, critics argue that CTE serves to track low-achieving and/or minority students into educational programs that do not prepare them for work beyond low-wage, entry-level positions. While this brief does not aim to settle this dispute, we can begin to shed light on what types of students are participating in CTE across Michigan.

Figure 2 focuses on the expected Class of 2018 to provide a recent snapshot of CTE in Michigan. Male students are roughly 20% (9 percentage points) more likely to participate in CTE than female students. A greater share of White students (54.2%) participate than do Black (41%) or Hispanic (44.1%) students. Economically disadvantaged students (i.e., those who qualify for free or reduced price lunch) participate at a level lower than the statewide average. Students who attend urban schools are significantly less likely to participate compared to students in suburban, town, and rural environments. Students enrolled in charter schools are 36 percentage points less likely to participate than their peers who attend traditional public schools.

Figure 2: CTE participation varies across groups among the expected class of 2018

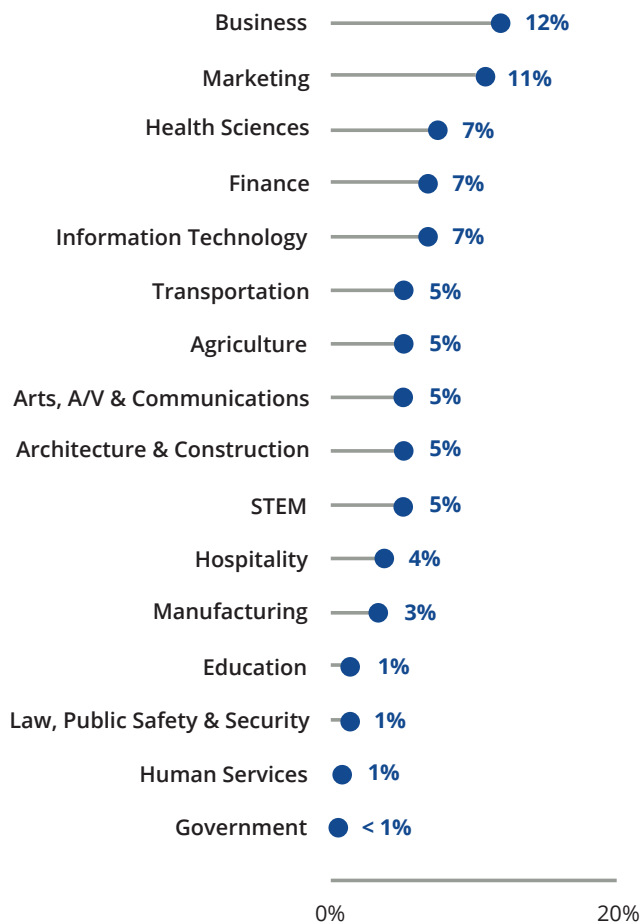


We find similar patterns when examining completion rates, with the notable exception that female students are actually more likely than males to complete programs once enrolled. See the Appendix for further details.

The 17 distinct Career Clusters and 52 Programs of Study within CTE represent a broad spectrum of industries and occupations. We find that enrollment levels vary widely across clusters.

The most popular programs are business, marketing, and health sciences (see Figure 3). Public and human services exhibit the lowest participation levels. It is important to note that student interest is not the sole driver of program popularity. Because CTE courses are organized largely as project-based learning environments that afford students the opportunity to experience actual workplace conditions, certain programs require expensive equipment that can be cost prohibitive for some schools. This may explain why programs in business, marketing, and finance are so popular – they require little in the way of resources schools do not already possess.

Figure 3: CTE participation varies by career cluster among the expected class of 2018



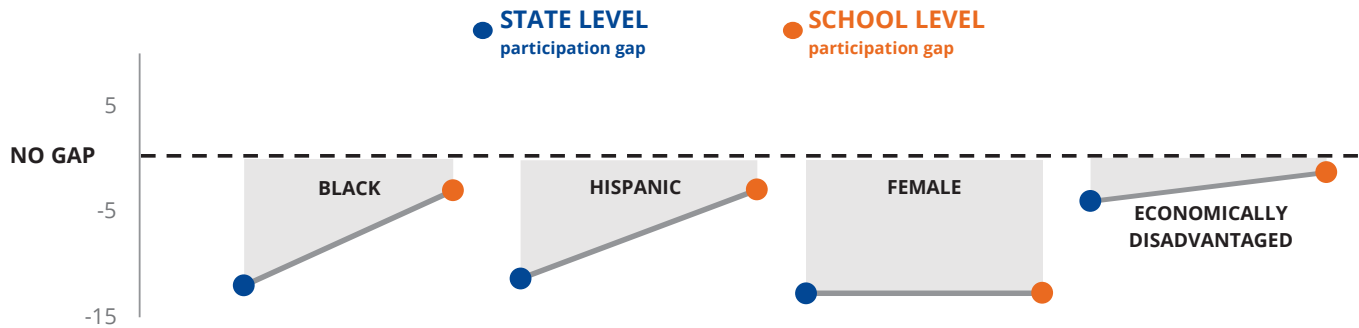
Can Access Explain Participation?

Figure 2 shows that Black, Hispanic, female, and economically disadvantaged students are less likely to participate in CTE programs throughout the state. The reason for these demographic participation gaps is unclear, however. On the one hand, it is possible that they result from lower relative interest in CTE (i.e., demand). On the other hand, it may be that students from these groups face reduced access to CTE programs (i.e., supply). That is, they may attend schools that typically offer fewer opportunities to participate in the first place.

Given this ambiguity, the ideal next step would be to identify the number of programs available to the typical student from each demographic group both within their own school and a reasonable driving distance. Juxtaposing these figures would allow us to determine whether and to what extent access is differentiated along racial, socioeconomic, or geographic lines. Unfortunately, comprehensive statewide data on which specific CTE programs are available at each high school does not yet exist.^x The Youth Policy Lab is actively working with the available data to piece together this information.

In the meantime, we probe whether demographic participation gaps result from access to or demand for CTE by comparing students who attended the same high school. This allows us to “control for” access to CTE because all students within a school have the same number and types of programs available to them. We also employ a commonly used statistical technique called multiple regression analysis to account for a number of important student characteristics: gender, race/ethnicity, special education status, free or reduced lunch eligibility, neighborhood education level, eighth-grade attendance, and prior academic achievement as measured by standardized test scores. (See the Appendix for a full explanation of our analytic approach.)

Figure 4: The racial participation gap at the state level largely disappears at the school level, but the gender gap persists.



Note: For Black and Hispanic students the reference group is White students; for females it is males; for economically disadvantaged students it is economically secure students.

If participation gaps shrink after looking within schools, this would indicate that participation differences at the state level result from unequal access across communities. If they persist (or grow), we can feel more confident that groups exhibit disparate levels of demand for CTE.

Figure 4 displays the results for the expected Class of 2018. Our results indicate that female students remain 9 percentage points less likely to participate in CTE relative to males who attend the same school. Racial disparities, however, are greatly diminished. The participation gap shrinks from roughly 12 percentage points for both Black and Hispanic students at the state level to 3 percentage points for the former and 2 points for the latter within schools. Students eligible for free or reduced price lunch become just 1 percentage point less likely to participate in CTE relative to their more affluent peers.

These results tell us that differences between school opportunities rather than student interest are driving racial and socioeconomic participation gaps at the state level. Female students, by contrast, seem to exhibit less demand for CTE compared to males.

Program Completion

While our analyses thus far have focused on participation levels, there are compelling reasons to investigate program completion rates as well. Current research indicates that the benefits of CTE enrollment are driven entirely by upper-level coursework, particularly in highly technical fields.^{xi} This suggests that specialization in a field and completing a Program of Study may be critical. Indeed, Programs of Study are intentionally designed with this sort of progression in mind. MDE OCTE sets content standards to structure programs such that students are guided through a coherent sequence of training objectives. This raises the question of whether Michigan students are completing their programs and, moreover, whether they are more likely to complete some types of programs than others.

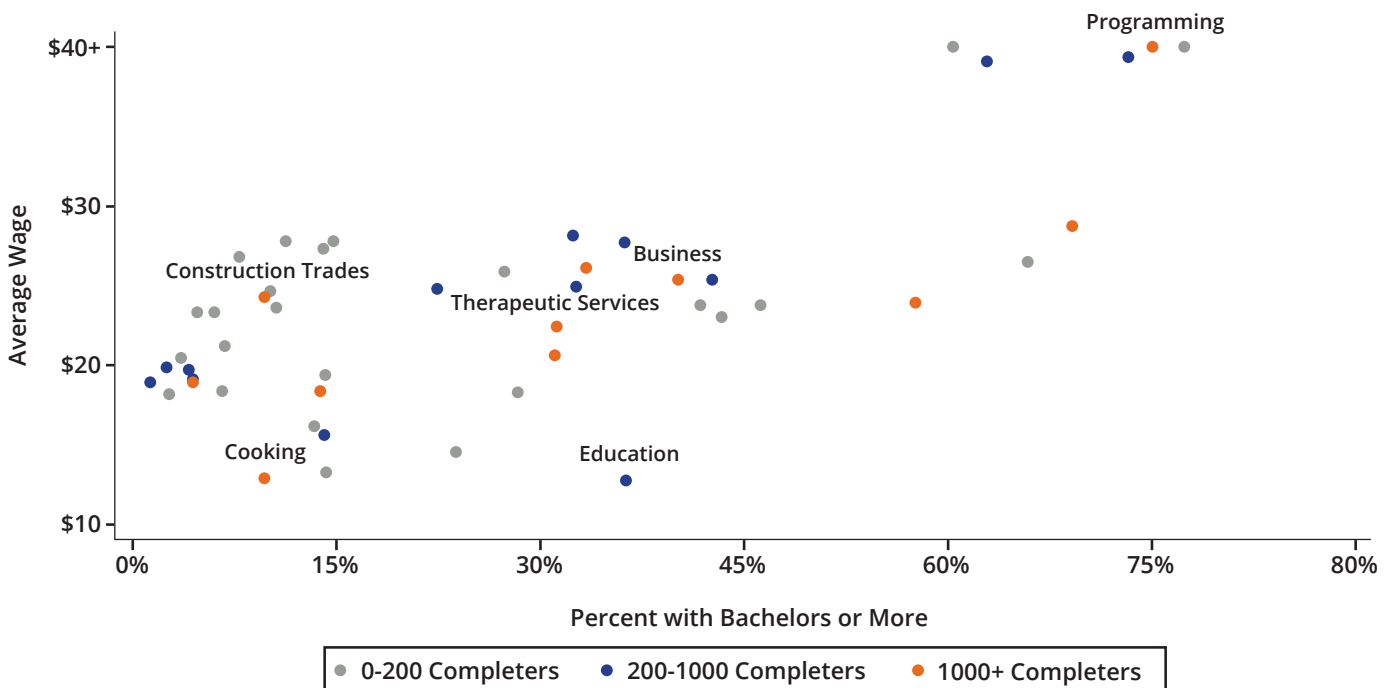
With 52 Programs of Study spread across 17 Career Clusters, the many jobs that CTE programs map onto differ significantly with respect to the educational attainment they typically require and the earning potential they offer. To obtain a sense of the educational requirements and labor market opportunities associated with each CTE program, we utilize a crosswalk created by the state that links programs to occupations. For each occupation, we use data from the American Community Survey to calculate the average hourly wage in the occupation and the share of workers in the occupation who have at least a bachelor's degree. We can then aggregate this information to the CTE program level.

Our results, displayed in Figure 5, reveal a varied set of employment opportunities across programs. Although wages are generally concentrated between \$20 and \$30 per hour, there are clear outliers. Some programs lead to jobs that typically earn half as much while others nearly double those figures. The range of educational attainment levels is similarly broad. It is clear that Michigan students have a diverse set of options within CTE.

Perhaps most interestingly, at almost every educational level, there is substantial variation in program average earnings. For example, cooking and construction trades have labor forces with similar levels of college degree attainment. Yet average hourly wages in construction are roughly \$24 per hour compared with only \$13 in cooking. We find comparable wage discrepancies between business and education where approximately 40% of workers have a college degree.

It is important to note that the wages people typically earn in related occupations should not be conflated with the wages individuals earn *as a result of* enrolling in CTE. Estimating the latter requires linking wage record data to these CTE data, each of which comes from different departments within the State of Michigan. Through a partnership between YPL, OCTE, and the State's Department of Labor & Economic Opportunity (LEO), YPL will analyze CTE's impact on participants' employment and earnings in future work.

Figure 5: Employment opportunities vary across programs



Some fields are especially relevant to Michigan's continued economic recovery following the Great Recession. LEO has argued that convincing high school students to pursue careers in the skilled and professional trades is vital as more Baby Boomers retire.^{xii} Over 500,000 skilled trades jobs are expected through 2026, primarily in construction, manufacturing, healthcare, automotive technology, and information technology.

Of the five Career Clusters that produce the most Completers, two are related to these high-demand fields: Health Science and Information Technology (see Table 1). With 5,458 completers among the expected Class of 2018, Health Science actually ranks as the highest among all clusters. Information Technology has produced the fourth-highest number of completers with 2,731. On the other hand, Marketing and Business, fields the state has not identified as likely to spur job growth, produce the second- and third-most completers (4,256 and 3,319, respectively). The three other "high-demand" fields – Construction, Transportation, and Manufacturing – have each produced similar numbers that rank near the middle of the pack among all clusters.

The number of students who complete a program is driven by both the number who participate and the fraction of participants who go on to complete. For this reason, it is important to consider both completion and participation rates when identifying ways to increase the number of completers in high-demand fields. While Health Science excels in both respects, the remaining four high-demand clusters would seem to require varying approaches. Table 1 shows that although Manufacturing and Construction exhibit decent completion rates, they have relatively low rates of participation. Conversely, Information Technology and Transportation are popular programs but turn only one out of every three participating students into a completer.

A couple of important caveats apply here. First, failing to complete a program is not necessarily an undesirable outcome. By trying a program, students may learn about their level of interest and comparative advantages in a given profession. Discovering that they ultimately wish to pursue a different path can be instructive. Second, as stated above, we have yet to rigorously study CTE's effects on employment outcomes. The relationships we highlight here are merely descriptive and motivate future analyses.

Table 1: Completion rates do not track participation rates

Career Cluster	Number of Completers	Participation Rate Among All Students	Completion Rate Among Participants
Health Science	5,458	7.3%	64.6%
Marketing	4,256	10.6%	35.8%
Business	3,319	11.8%	24.3%
Information Technology	2,731	6.7%	33.6%
Arts & A/V	2,196	4.8%	40.4%
Finance	2,145	6.7%	28.6%
Architecture & Construction	2,036	4.8%	37.6%
Transportation	1,763	5.0%	30.7%
STEM	1,742	4.5%	32.4%
Manufacturing	1,716	3.4%	43.9%
Hospitality	1,535	3.7%	36.2%
Agriculture	1,516	5.0%	26.9%
Education	884	1.4%	55.5%
Law & Public Safety	867	1.2%	62.7%
Human Services	358	0.7%	46.4%
Government	89	0.4%	21.6%

CONCLUSIONS AND POLICY IMPLICATIONS

Policymakers interested in providing future generations with pathways to economic security face a puzzling dilemma. Although poverty and inequality have been on the rise for some time, there is compelling reason to believe that postsecondary education – long considered the surest way to counter these forces – may not be the most effective route to long-term economic success for all young people. A significant share of students who begin college never obtain a degree and an increasing share of students are borrowing large sums to finance their educations. Thus, society must explore additional opportunities to equip young people with the knowledge and skills to buffer against the danger of economic insecurity. CTE represents a promising way of accomplishing that goal.

Here in Michigan, CTE is already a common part of many students' high school experiences. Roughly half of each recent cohort has enrolled in CTE at some point during high school. That said, our analysis suggests that some racial groups may have substantively differential access to CTE. We see that Black and Hispanic students are less likely than their White peers to enroll in CTE at the state level but are essentially just as likely to participate within a given school. This finding highlights the need for continued research on how access to CTE may vary across communities. Ultimately, we need more comprehensive data on CTE course availability to support the State in their efforts to better understand CTE delivery in Michigan schools.

We also presently lack compelling evidence about which programs (if any) lead to improved labor market outcomes. While states, districts, and even schools exercise a great deal of control over CTE program design and delivery compared to other aspects of education, we do not know much about the relationship between CTE and earnings or employment, for example. This is particularly problematic because CTE programs cover a wide range of industries and it is likely that costs and benefits of each similarly vary. Nuanced and reliable estimates of the effects of CTE participation, therefore, could help administrators make more informed decisions about how to allocate scarce resources towards programs with the greatest chances of improving economic opportunity. The YPL research team will begin to shed light on this area in future work.

ENDNOTES

- i Beckhusen, J. (2019). Multiple jobholders in the United States: 2013. U.S. Census Bureau. Current Population Reports. P70BR-163.
- ii Fontenot, K., Semega, J., & Kollar, M. (2018). Income and poverty in the United States: 2017. U.S. Census Bureau. Current Population Reports. P60-263.
- iii Saez, E. (2013). Striking it richer: The evolution of top incomes in the United States. *Pathways Magazine*, 1-10.
- iv Chetty, R. et al. (2014). Where is the land of opportunity? The geography of intergenerational mobility in the United States. *The Quarterly Journal of Economics*, 129(4), 1553-1623.
- v U.S. Department of Education, National Center for Education Statistics. (2015). Education Longitudinal Study of 2002 (ELS:2002), Postsecondary Attainment: Differences by Socioeconomic Status.
- vi U.S. Department of Education, National Center for Education Statistics. (2018). The Condition of Education 2018 (NCES 2018-144), Undergraduate Retention and Graduation Rates.
- vii Looney, A., & Yannelis, C. (2018). Borrowers with large balances: rising student debt and falling repayment rates. Washington D.C.: The Brookings Institution.
- viii State of Michigan, Office of Governor Gretchen Whitmer, (2019, March 5). Gov. Gretchen Whitmer's 2020 budget focused on roads, education, and clean water [Press release]. Retrieved from <https://www.michigan.gov/whitmer/0,9309,7-387-90499-491245--,00.html>
- ix In Michigan, intermediate school districts are formal education agencies typically organized at the county level that incorporate multiple local districts. ISDs assist constituent local districts in providing programs and services such as CTE and special education. Local districts within an ISD can form consortia by agreeing to share CTE programs with one another. Consortia may not include all local districts within an ISD.
- x Two key data limitations prevent us from quantifying the access gap among Black, Hispanic, and economically disadvantaged students. First, our data do not contain a definitive and exhaustive list of CTE programs available at each high school or career technical center across Michigan. We can only observe which programs in a given school students have enrolled in after the courses concluded. Measuring access this way poses a critical limitation – namely, the fact that students have participated in a particular set of programs does not necessarily mean there were no other programs in which they might have enrolled. Second, the regulations that govern students' ability to travel to participate in CTE make it especially challenging to determine access across campuses. The decision of whether or not to permit students from neighboring districts is left to the discretion of the receiving district. Moreover, some programs within a given high school may permit incoming students while others may not. Ultimately, idiosyncratic agreements between schools and districts determine who can travel where and for which programs. So although we are able to observe which CTE programs exist within a 30-minute radius of each school in the state, we do not have a way of differentiating between ones that do and do not accept students from other schools or districts. Counting all programs within a drivable distance could therefore inflate the number of programs that are truly accessible to students.
- xi Kreisman, D., & Stange, K. (2017). Vocational and career tech education in American high schools: The value of depth over breadth. *Education Finance and Policy*, 1-72.
- xii Barrett, M. (2019). Michigan launches \$3M campaign to meet gap in skilled trades jobs by 2026. Retrieved from <https://www.mlive.com/public-interest/2019/05/michigan-launches-3m-campaign-to-meet-gap-in-skilled-trades-jobs-by-2026.html>

APPENDIX

Data

We use data drawn from student-level longitudinal data files provided by the Michigan Department of Education (MDE and the state Office of Career and Technical Education (OCTE) through the Michigan Center for Education Performance and Information (CEPI). K-12 student files provide yearly information about enrollment, attendance, graduation, and demographics for students enrolled in public Michigan K-12 schools each year. CTE student data contains CTE participation, completion, and courses taken as well as the related Classification of Instructional Program (CIP) codes and Career Clusters. We obtain some school-level variables from the National Center for Education Statistics' Common Core of Data (CCD).

We also use data from the American Community Survey to determine the average wages and educational levels of people working in CTE-related occupations. We calculate the average wage and education level for each ACS occupation (OCC), and map each OCC into its 2010 Standard Occupational Classification (SOC2010). We in turn map these into CIP codes using the OCTE's administrative list of anticipated occupations for each program of study and take the CIP-level weighted averages of the wage and education across occupations using the number of people in each occupation as weights.

We limit our sample to first-time ninth graders who attended a Michigan public school (including charters) between the 2006-07 and 2014-15 school years (n=1,143,722 students). They comprise nine cohorts from the expected graduating classes of 2010 to 2018. We refer to the year of the expected graduation of an incoming ninth grade cohort as the cohort year. We exclude from the sample a small proportion of students for various reasons. First, we drop students who attended nontraditional public schools (n=46,156), a small school with fewer than 50 students (n=5,620), or students listed as attending state-operated, private, or elementary schools (n=98). Second, we drop students missing key demographic information including gender, eligibility for free or reduced-price lunch, or school size (n=2,380). We then use the CTE Student data to determine which of these students were CTE participant, concentrators, or completers and which programs they participated in.

APPENDIX

Analysis and Methodology

Figure 1 CTE Participation by Cohort: This figure reports the fraction of students in each expected graduating class who ever participated in CTE while in high school. Each column represents one cohort and the shaded region of each column, the participation rate among students in that cohort. The sample is the full sample defined above.

Figure 2 CTE Participation by Demographics: This figure reports the participation rate of students with given characteristics. The sample is only the most recent cohort (2018). Student level variables come from K-12 data as recorded in the 9th grade year. School level variables come from the CCD and are defined in that same year. Groups are mutually exclusive within demographic categories (i.e., race, gender, etc.) but not across categories. Categories are not necessarily collectively exhaustive.

Figure 3 CTE Participation by Career Cluster: This figure reports the participation rate of students in each Career Cluster. The sample is only the most recent cohort (2018). Programs of study are defined by CIP code and are nested within Career Clusters. There are 17 career clusters, 16 of which are listed here. Students can participate in multiple programs (and therefore clusters) so the rates need not sum up to the overall participation rates.

Figure 4 Demographic Participation Gaps: This figure shows regression adjusted participation gaps. The sample is only the most recent cohort (2018). For the state level gap we estimated the equation

$$y_{ist} = \beta X_i + \epsilon_{ist}$$

where X_{ist} are student demographic and scholastic characteristics (gender, race, reduced price lunch, neighborhood education, eighth grade test scores and attendance, special education, and limited English proficiency).

The blue dots are the regression coefficients for Black, Hispanic, female, and economically disadvantaged. They represent the average regression-adjusted difference in participation rates relative to whites, males, and economically secure students respectively.

For the school-level gap, we estimate the same equation but with school fixed effects for each 9th grade school:

$$y_{ist} = \beta X_i + \phi_s + \epsilon_{ist}$$

The school fixed effect controls for all of the unobserved determinants of CTE participation at the school. The orange dots are the estimated coefficients on the same characteristics now making within-school comparisons.

Figure 5 Education and Wages by Program: This figure displays the average wage and average education level in occupations related to each program. These variables are obtained by mapping occupation data from the ACS to the CTE programs offered in Michigan (see data portion of Appendix for details). It also shows the number of completers in each program from the 2018 cohort.

Table 1 CTE Completion by Career Cluster: This table reports the number of completers, completion rate, and participation rate of students in each Career Cluster. Completion rates are calculated among CTE participants within a given cluster rather than the entire student population. The sample is only the most recent cohort (2018). Programs of study are defined by CIP code and are nested within Career Clusters. There are 17 career clusters, 16 of which are presented here.

APPENDIX

Table A1: 17 Career Clusters and associated Programs of Study

Career Cluster	CIP Code	Program Name
Agriculture, Food & Natural Resources	01.0000	Agriculture, Agricultural Operations and Related Sciences
	01.0101	Agriculture, Food & Natural Resources
	01.0601	Applied Horticulture and Horticultural Operations
	01.0903	Animal Health & Veterinary Science
	03.0000	Natural Resources and Conservation
	03.0601	Zoo & Aquarium Management
	26.1201	Biotechnology
Architecture & Construction	15.0403	Electro-Mechanical Technology
	15.0612	Industrial Production
	15.1301	Drafting and Design Technology
	19.0605	Home Furnishings Equipment Installers and Consultants
	46.0000	Construction Trades
	46.0301	Electrical and Power Transmission Installation
	46.0401	Building Maintenance
	46.0502	Pipefitting Technology
	46.0503	Plumbing Technology
	47.0201	Heating, Air Conditioning, Ventilation and Refrigeration
Arts, A/V Technology & Communications	10.0202	Radio & TV Broadcasting Technology
	10.0301	Graphics and Printing Technology and Communications
	19.0906	Fashion Design
	50.0101	Visual & Performing Arts
	50.0401	Visual Communications Technology
Business, Management & Administration	52.0299	Business Administration Management and Operations
Education & Training	13.0000	Education General
Energy	46.0303	Electric Lineman

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Career Cluster	CIP Code	Program Name
Finance	52.0800	Finance & Financial Management Services
	52.0803	Banking
	52.1701	Insurance
Government & Public Administration	28.0301	Army (JROTC)
Health Science	26.0102	Biotechnology Medical Services
	51.0000	Therapeutic Services
	51.0707	Health Informatics
	51.1000	Diagnostic Services
Hospitality & Tourism	12.0500	Cooking and Related Culinary Arts
	12.9999	Personal and Culinary Services
Human Services	12.0400	Cosmetology
	19.0700	Child and Custodial Care Services
Information Technology	11.0201	Computer Programming/Programmer
	11.0801	Digital/Multimedia and Information Resources Design
	11.0901	Computer Systems Networking and Telecommunications
	11.1000	Information Technology
	11.1001	Systems Administrator/Administrator
	11.1003	Computer and Information Systems Security/Informat
Law, Public Safety, Corrections & Security	43.0100	Public Safety/Protective Services
Manufacturing	14.3601	Manufacturing Technology/Technician
	47.0101	Electrical/Electronics Equipment Installation and Repair
	47.0616	Marine Maintenance
	48.0000	Precision Production Trades General
	48.0501	Machine Tool Technology/Machinist
	48.0508	Welding, Brazing and Soldering
	48.0701	Woodworking General
Marketing	52.1999	Marketing, Sales and Service

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Career Cluster	CIP Code	Program Name
Science, Technology, Engineering and Mathematics	14.4201	Mechatronics
	15.0000	Engineering Technology
	15.1306	Mechanical Drafting
Transportation, Distribution & Logistics	47.0399	Heavy Industrial Equipment Maintenance Technologies
	47.0603	Collision Repair Technician
	47.0604	Automotive Technician
	47.0606	Small Engine & Related Equipment Repair
	47.0607	Airframe Technology
	47.0608	Power Plant Technology (Aircraft)
	47.0609	Avionics Maintenance Technology
	47.0613	Medium/Heavy Truck Technician
	49.0101	Aeronautics/Aviation Aerospace Science & Technology

APPENDIX

Table A2: Completion Rates by Demographic Group (Expected Class of 2018)

Demographic Group	Completion Rate (Among Participants)
All students	48.3%
Male	46.8%
Female	50.2%
White	50.8%
Hispanic	45.8%
Black	37.5%
Special Education	39.9%
Limited English Proficiency	41.6%
Suburban	48.6%
Rural	50.9%
Town	54.2%
Urban	39.8%
Traditional Public School	48.6%
Charter School	37.6%

DISCLAIMER

This analysis utilizes data obtained through a confidential data application process submitted to the Michigan Education Data Center (MEDC)/ Michigan Education Research Institute (MERI). Youth Policy Lab at the University of Michigan requested data access and completed the analysis included in this report. The data are structured and maintained by the MERI-Michigan Education Data Center (MEDC). MEDC data is modified for analysis purposes using rules governed by MEDC and are not identical to those data collected and maintained by the Michigan Department of Education (MDE) and/or Michigan's Center for Educational Performance and Information (CEPI). Results, information and opinions solely represent the analysis, information and opinions of the author(s) and are not endorsed by, or reflect the views or positions of, grantors, MDE and CEPI or any employee thereof.

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Youth Policy Lab

The University of Michigan Youth Policy Lab helps community and government agencies make better decisions by measuring what really works. We're data experts who believe that government can and must do better for the people of Michigan. We're also parents and community members who dream of a brighter future for all of our children. At the Youth Policy Lab, we're working to make that dream a reality by strengthening programs that address some of our most pressing social challenges.

We recognize that the wellbeing of youth is intricately linked to the wellbeing of families and communities, so we engage in work that impacts all age ranges. Using rigorous evaluation design and data analysis, we're working closely with our partners to build a future where public investments are based on strong evidence, so all Michiganders have a pathway to prosperity.

CTEX

The Career and Technical Education Policy Exchange (CTEx) is a multi-state policy lab dedicated to improving the quality of high school Career and Technical Education programs in the US. We work side-by-side with state and local partners in Massachusetts, Michigan, Rhode Island, and Tennessee to develop data-driven policy recommendations ensuring all students are ready for both college and career. CTEx provides actionable, evidence-based research directly to policymakers and practitioners. While part of our contribution is in compiling longitudinal databases, the lab also focuses on facilitating research on the causal impact of various aspects of CTE education on student success.