YOUTH POLICY LAB
UNIVERSITY OF MICHIGAN

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How Access to CTE Varies Across Michigan Schools and Students

AUTHORS:

Brian A. Jacob

Jeremy Guardiola

KEY FINDINGS:

1. Economically disadvantaged, Black, and Hispanic students have less overall access to CTE and are less likely to attend schools with at least one CTE program.
2. Total program availability (i.e., in-school and via travel) is greater for all demographic groups in districts with CTE-designated property taxes (millages) and these districts exhibit smaller socioeconomic and racial gaps in CTE access.
3. CTE participation and completion rates are significantly higher in schools with CTE programs.

INTRODUCTION

Despite much attention paid to the issue, educational inequality remains a consequential source of injustice in our society. For example, students of color and economically disadvantaged students are more likely to be taught by less qualified, lower paid, and less experienced teachers, and they are less likely to have access to advanced courses.[1,2,3] As a result, recent education policy has focused on increasing college access for underserved students in hopes of disrupting the link between a student's current circumstances and their future socioeconomic prospects. However, given low college completion rates and increasing levels of student debt, many have begun searching for alternative pathways so that the circumstances one inherits at birth do not determine one's chances for economic security.

One such pathway is vocational education, or career and technical education (CTE), which schools have long offered alongside core academic subjects. By providing students with hands-on training in fields that employ skilled workers, CTE offers a possible route to economic security that does not require a four-year college degree. However, supporters and critics have spent years arguing whether CTE makes good on that promise or simply serves as a so-called "dumping ground" for less academically inclined students.[4]

An emerging body of evidence suggests that CTE does benefit students in important ways and merits inclusion in our analyses of educational opportunity. Multiple studies have found that students who participate in CTE enjoy higher earnings in the labor market.[5,6,7] Other studies find CTE participation increases high school graduation rates.[8,9] In our own research, we find that students with disabilities in Michigan who complete a CTE program graduate high school at significantly higher rates than other students with disabilities.[10]

Although CTE has the potential to improve students' educational and economic outcomes, we know relatively little about who has access to these programs. In an earlier policy brief, we reported general enrollment trends across demographic groups and program types. This study builds off that work by incorporating CTE availability to bring to the surface the structural foundations underlying our previous findings.

At a high level, we aim to understand the options for enrolling in CTE that students have available to them. To do so, we begin by explaining the different ways that students in Michigan can access programs. Then, we analyze how CTE availability varies in a few important ways:

1. by location, school characteristics, and student demographics,
2. by program type, and
3. according to the type of model that a district uses to fund and deliver CTE.

Finally, we assess the extent to which CTE availability influences enrollment and program completion.

> "**Although CTE has the potential** to improve students' educational and economic outcomes, **we know relatively little about who has access to these programs.**"

CTE FUNDING AND DELIVERY MODELS IN MICHIGAN

Before presenting our analyses, it is important to explain the different ways that students can access CTE programs. Students can enroll in programs at their home high schools or travel to an off-site location to participate in a program. Off-campus locations can include other comprehensive high schools, contracted program sites (e.g., beauty schools, equipment repair garages, or community colleges), or standalone CTE centers. Students' ability to enroll in programs that require travel is determined by agreements their school district may have with other entities. Even in cases where districts have such agreements, however, students may need to secure their own transportation.

Michigan districts use three main models to deliver CTE programs and raise funds beyond the standard sources (i.e., federal Carl D. Perkins funds, State School Aid categorical funds, and per-pupil foundation grants): local millages, consortia, and independent operations. Whereas millages standardize program access across schools and districts, travel agreements are ad hoc in the other models and can vary by location.

TABLE 1: Michigan's three CTE funding and delivery models

	CTE program operated by		
	Intermediate School District	Consortium of local school districts	A single local school district
Description	An intermediate school district (ISD) shares programs among all its local districts (local districts may opt out)	A group of neighboring local districts agree to share some or all their programs	A local district operates programs that it may or may not make available to external districts
Program Enrollment Eligibility*	Any grade-eligible student in the taxed local school districts	Grade-eligible students attending one of the local member districts	Operating district decides
Slot Allocation Method	Usually, a school's share of the ISD's 11th- and 12th-grade student population	Member districts negotiate	Operating district decides
Funding Sources (Beyond State and Federal)	ISD levies a property tax called a millage across all constituents' local districts	Negotiated tuition fee for visiting students	Negotiated tuition fee for visiting students (if applicable)
Administrative Entity	The taxing ISD	The local district that hosts a given program (can be multiple in a consortium)	The local district

* Note: These are general enrollment eligibility criteria for the three primary delivery systems. However, local districts and ISDs can set other requirements such as minimum GPA and progress towards graduation.

Intermediate School Districts (ISDs) are a popular CTE delivery system throughout Michigan. These are county-level educational agencies that work with local districts to implement programs like CTE and special education services. ISDs can propose property taxes called millages to help fund CTE programs. If the initiative passes, ISDs can pool resources across an entire county and provide a larger and more varied set of program options to students than any individual local district could offer on its own.[11] All programs that receive financial support from a millage must be available to all grade-eligible students from every school within the taxed districts. For this reason, millages commonly funds central, countywide CTE centers, although some ISDs will use millages to fund programs that operate in traditional comprehensive high schools. A school typically receives several slots in a program that is proportional to its share of the ISDs total 11th and 12th grade student population.

Other local districts share programs (and costs) by forming a CTE consortium wherein they agree to share some or all their programs with one another. Member districts negotiate the CTE consortium terms - including which programs on a given campus are available to external students, the number of slots in a program available to other districts, and the tuition fee that schools must pay to send students to a program. Note that consortia do not always include every district within a given ISD.

Local districts can also operate CTE programs independently. These districts use their general per-pupil foundation allowances and state funding from Sections 61a(1) and 61b of the School Aid Act to finance CTE programs.[12] If such a district allows other districts to send students to its programs, the host district will usually charge the external district a negotiated tuition fee to supplement its funds. Some districts will operate all their programs this way because they do not belong to a consortium or an ISD with a millage. Some consortiums or millage districts operate local-only programs in addition to their shared programs. Independent districts with multiple high schools that offer CTE programs are free to determine their own rules for cross-campus enrollment eligibility and attendance fees for visiting students.

Depending on the number of students in a district and/or the size of its property tax base, these funding models can produce varying levels of financial resources. Financial resources, in turn, determine the number and type of programs that a given district can offer. Some CTE programs need little more than textbooks and a computer lab while others require large buildings full of specialized equipment. In order to operate machine-heavy programs, districts must have the necessary facilities and funds. Some can stand up these programs through traditional funding sources; others rely more heavily on donations from local companies.

> “...ISDs can pool **resources across an entire county** and provide a larger and **more varied set of program options to students** than any individual local district could offer on its own.”

DATA: SAMPLE AND HOW WE MEASURE AVAILABILITY

In order to avoid confounding factors associated with the COVID-19 pandemic, this report focuses on students who were in 11th grade during the 2017-18 school year. While the key findings we highlight in the report apply to earlier cohorts as well, we focus on a single cohort to simplify the presentation.[13]

Ideally, we would be able to study CTE availability using a master list with all the programs offered to students at each high school across the state. While there is an interactive online map that lists every program offered in each school, this tool lacks information about cross-campus enrollment eligibility.[14] That is, it displays where programs are offered but not which students from other locations are able to enroll in them. As such, we must determine availability by combining information from a variety of sources.

To begin, we assume that students have access to – are eligible to enroll in – all programs offered within their home high school. We also assume that students have access to programs located in standalone CTE centers that serve the student's district.

We use observed student enrollment patterns to determine a student's eligibility to participate in programs outside their home high school. For example, if a program is offered by another high school in the local district or the ISD, we assume that the program is "open" to students from another high school if at least five students from that high school have enrolled in the program in the past.[15]

Finally, our analyses in this report include school types that we excluded from calculations in prior publications, most notably public charters.[16] Although students who attend public charter schools (as well as alternative and special needs schools) participate in CTE at far lower rates, they are eligible to do so, and charter schools qualify for CTE funding according to federal legislation. By including these school types, we are therefore able to assess CTE availability for all students who attend public schools in Michigan.

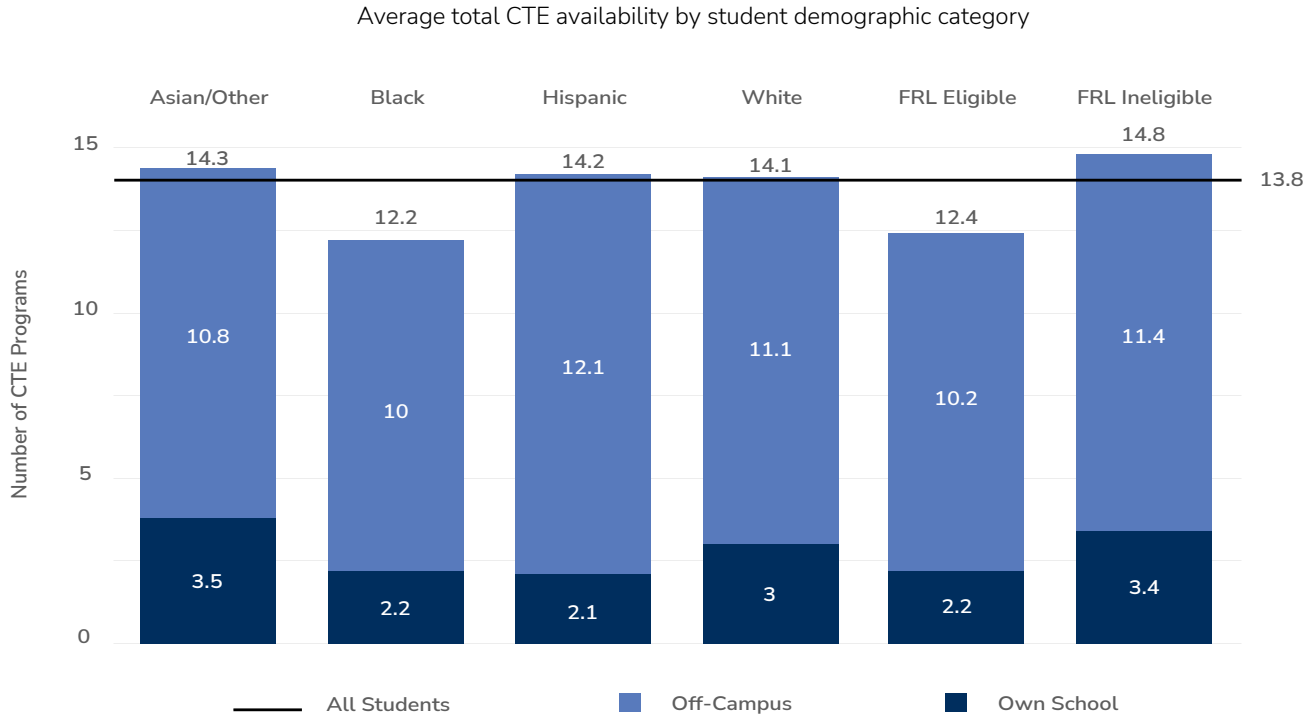
DIFFERENCES IN CTE ACCESS

CTE Availability by Demographic Group

On average, **public high school students in Michigan have access to approximately 14 CTE programs overall** (i.e., including those in their home school and those they can access via travel to another location). If we focus on programs that do not require travel, we find that the average student has access to 3 programs.

While helpful in developing a general sense of CTE availability in Michigan, these statewide numbers mask important variation by demographic characteristics. Our results indicate that access to CTE differs along racial, socioeconomic, and geographic lines.

FIGURE 1: CTE access varies across racial and socioeconomic groups



As Figure 1 demonstrates, **White students have almost one full additional program in their own school on average compared to Black and Hispanic students** (3.0 vs 2.2 and 2.1, respectively). Students who do not belong to these three racial categories (who are mostly students of Asian descent) have the most programs on their home campuses (3.5). **The average Black student has access to roughly two fewer programs at any distance compared to students of all other racial groups.**

On average, **students who are eligible for free or reduced-price lunch (FRL; our best proxy for socioeconomic disadvantage) can access one less program in their own school and 2.4 fewer programs overall** relative to students who are not eligible for this service.

To understand the causes for these discrepancies, it is helpful to see how access to different numbers of CTE programs compares across groups. Figures 2 and 3 show the share of students from different demographic groups with the lowest number of accessible CTE programs (none) all the way up to the highest (16 or more programs).

This shows us the "shape" of CTE availability for each group and tells us whether the average differences in Figure 1 arise from inequities across the spectrum or at the very low or very high ends of the distribution.

Approximately 40% of students can access between seven and fifteen programs regardless of their socioeconomic status. However, Figure 2 shows that **students who qualify for FRL are more than twice as likely to have access to three or fewer programs compared to their more affluent peers**. Conversely, students who are not eligible for FRL are 35% more likely to have access to at least sixteen programs.

As shown in Figure 3, **Black students are roughly three times as likely as White and Asian students to have access to no CTE programs at all**.

FIGURE 2: Economically disadvantaged students have access to fewer CTE programs on average

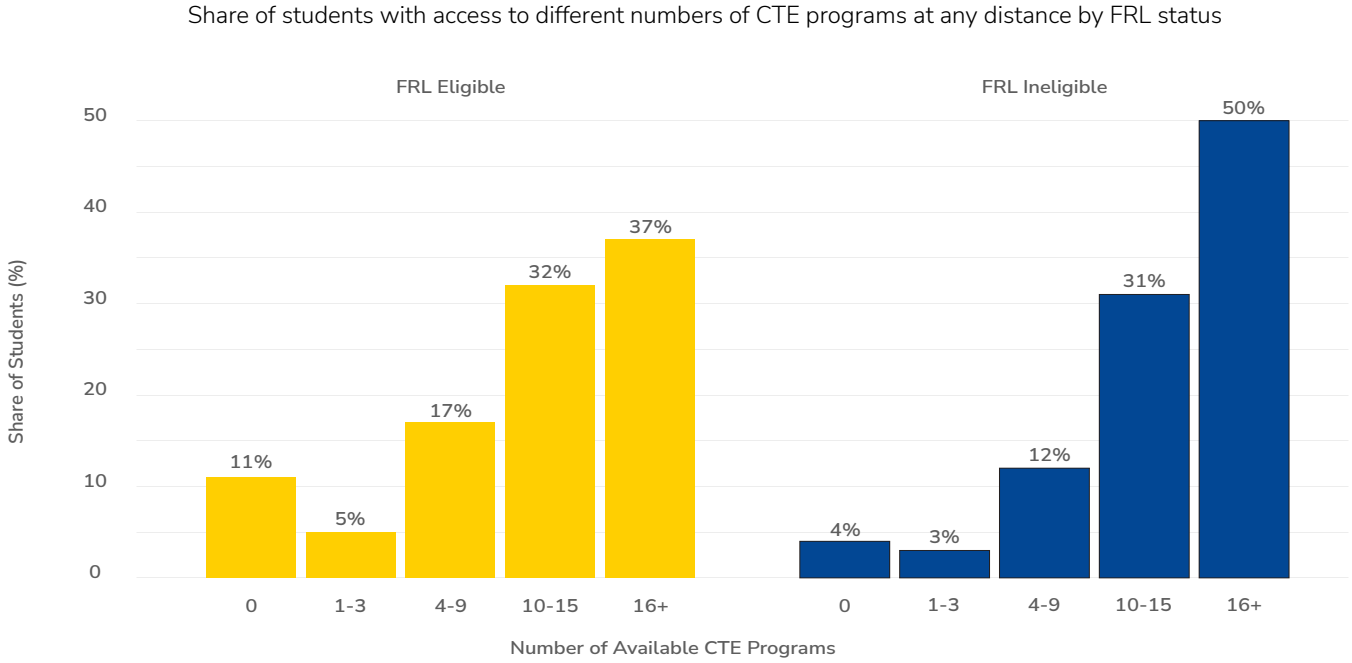
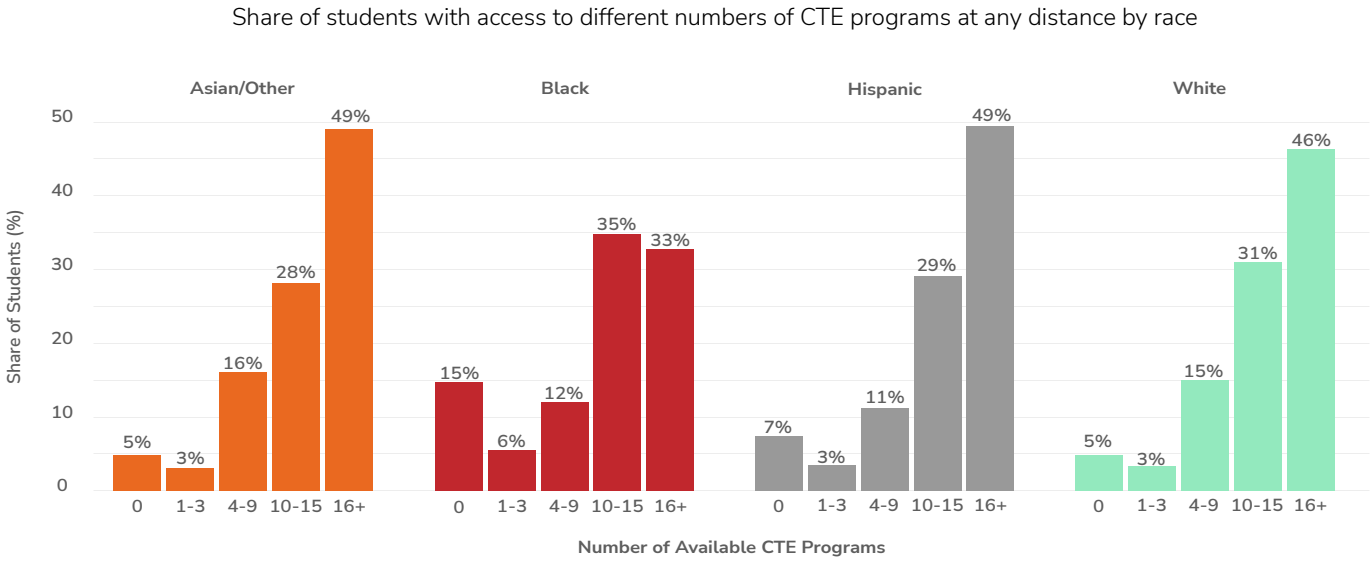
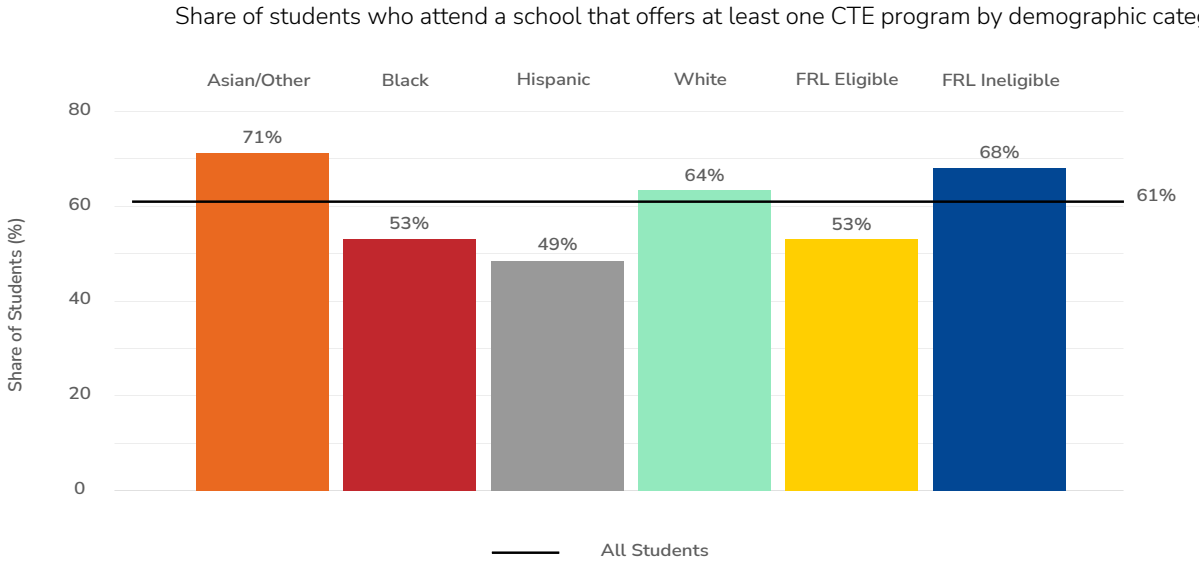


FIGURE 3: Black students have access to fewer CTE programs compared to other racial groups



Prior research indicates that whether or not students have CTE available in their school strongly predicts whether they will ever participate. We find that **schools enrolling higher shares of FRL-eligible, Black, and Hispanic students are less likely to offer on-campus programs**. Figure 4 shows the share of students from different socioeconomic and racial groups with at least one CTE program located in their school.

FIGURE 4: Schools serving higher concentrations of Black, Hispanic, and economically disadvantaged students are less likely to offer on-campus CTE programs



CTE Availability by Program Type

Michigan CTE programs span 17 career clusters, so we can also examine access to different types of programs. To do so, we use the six career zones from the Michigan Career Development Model and assign all programs within a cluster to a zone. (See Appendix 4 for a full explanation of these groupings.) Table 2 shows the average number of programs in each of these categories that students have available in their own school and overall.

Business, management, marketing and information technology are the most commonly offered within students' own schools because these programs do not require expensive, specialized equipment to operate. Many programs in the remaining career zones often are located off-site. For example, students might travel to a local beauty school for a cosmetology program, their district's elementary school for an education course, or a tech center across town for their machine tool technology program.

What kinds of schools offer more (or fewer) CTE programs?

The fact that CTE programs are offered school-wide – that is, all students at a given school have access to the same programs – tells us that the disparities between demographic groups stem from certain types of schools offering greater or less access. In other words, for FRL-eligible students to have fewer CTE programs available on average, it is necessarily true that schools with larger shares of FRL-eligible students tend to provide less access to CTE.

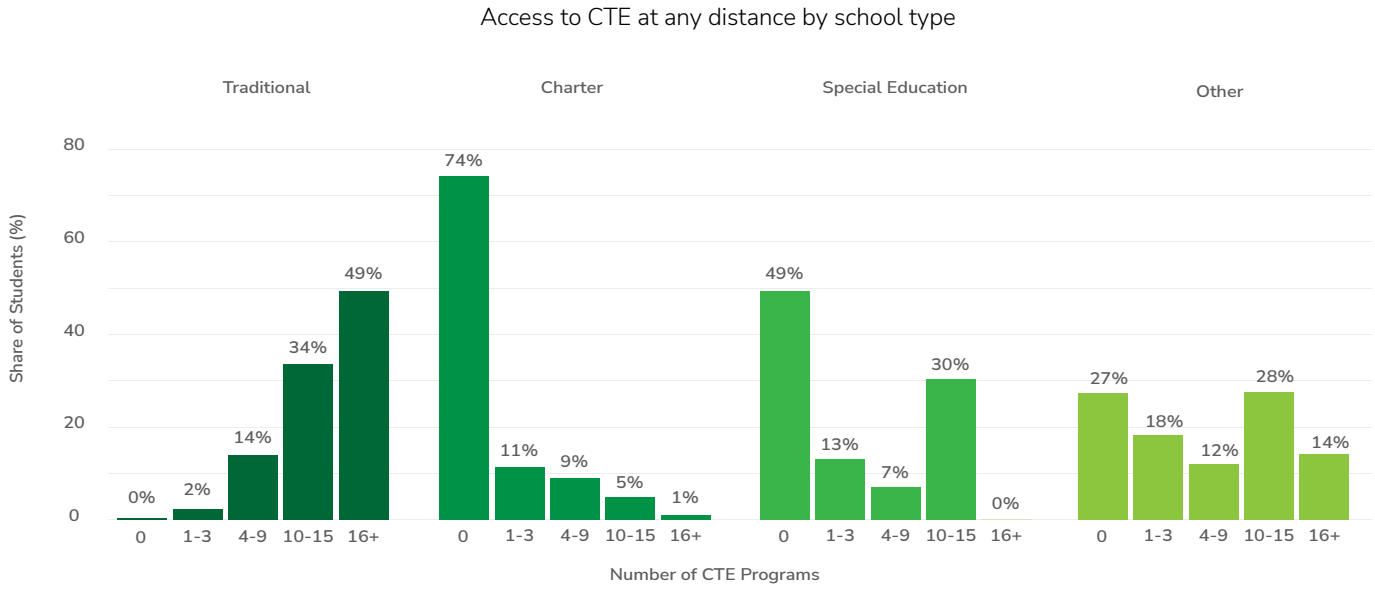
To identify the strongest predictors of CTE availability, we analyzed the relationship between various school characteristics and program access. These characteristics include school type (e.g., traditional comprehensive, special education, and charter), geography, enrollment size, and the demographic composition of a school's student body.

We start with school type. Here again we divide CTE availability into six bins and show the share of students within each school type with each level of access. Essentially all students who attend traditional comprehensive high schools have some level of access to CTE. More than four in five have access to at least 10 programs. Students who attend other types of schools face limited availability. **Nearly three-quarters of charter students have no CTE access; alternative and special needs schools also offer less CTE availability than traditional comprehensive high schools.**

TABLE 2: Most students must travel to access programs other than business and information technology

Average number of programs available by program type and location							
	All	Arts & Communications	Business, Management, Marketing & Technology	Engineering, Manufacturing & Industrial Technology	Health Sciences	Human Services	Natural Resources & Agriscience
% students with at least one on-campus program	61%	14%	52%	36%	14%	15%	9%
Average number of programs available at any distance	13.8	1.0	3.4	5.1	1.2	2.3	0.7

FIGURE 5: CTE access is significantly lower among students who do not attend traditional comprehensive high schools



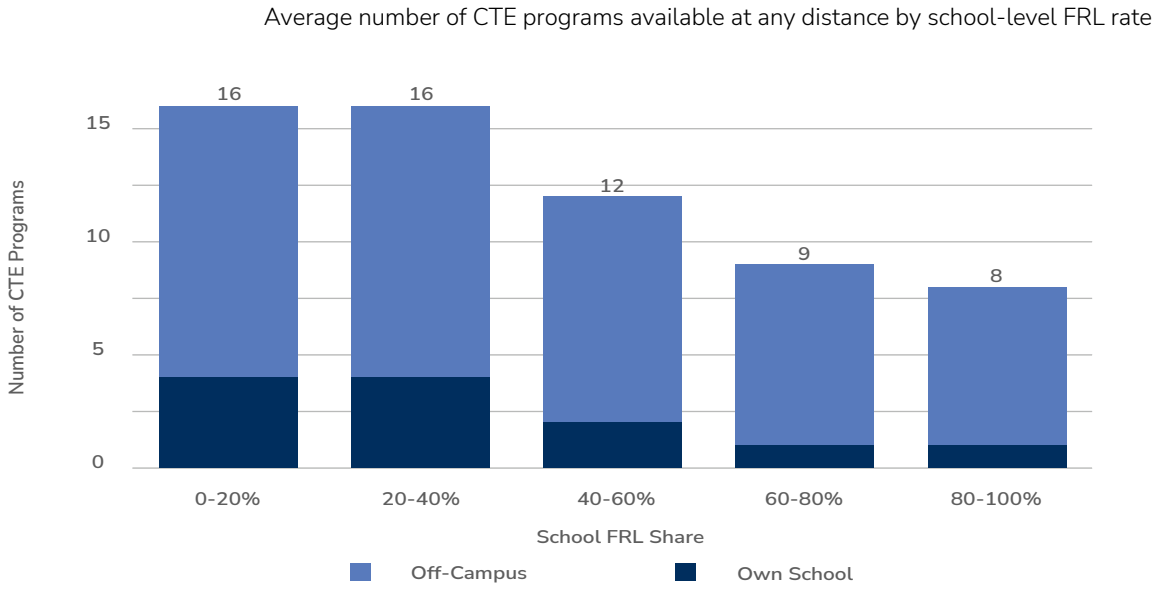
We next look at the geographic distribution of programs. Access to CTE is highest in suburban areas. Compared to students who attend schools in other geographic areas, **the average student who attends a suburban high school has access to approximately two more programs on their home campus and three more programs overall.**

Schools serving higher concentrations of economically disadvantaged students offer less CTE access (see Figure 6). Comparing a school with a 40% FRL rate against a school with an 80% FRL rate, for example, the latter will have access to five fewer programs on average. Other community-level measures of poverty such as employment rate and household income tell a similar story.

This finding highlights an important point about school finance policy – namely, that equal inputs (in this case, funding) do not necessarily lead to equal outputs (CTE availability). Under Michigan's current school funding system, the state guarantees a minimum per-pupil funding level. All local districts must levy a set number of property tax mills to support this funding floor; the state makes up the difference for districts whose property tax bases do not allow them to meet the minimum at the specified mill rate. As our results suggest, however, different districts are required to allocate resources in different ways. High-poverty schools, for example, often must prioritize academic support services and resources that address students' nonacademic needs due to the extra challenges their students face.[17] This may leave them with fewer resources to dedicate to expensive CTE programs (or even to provide students transportation to nearby programs).

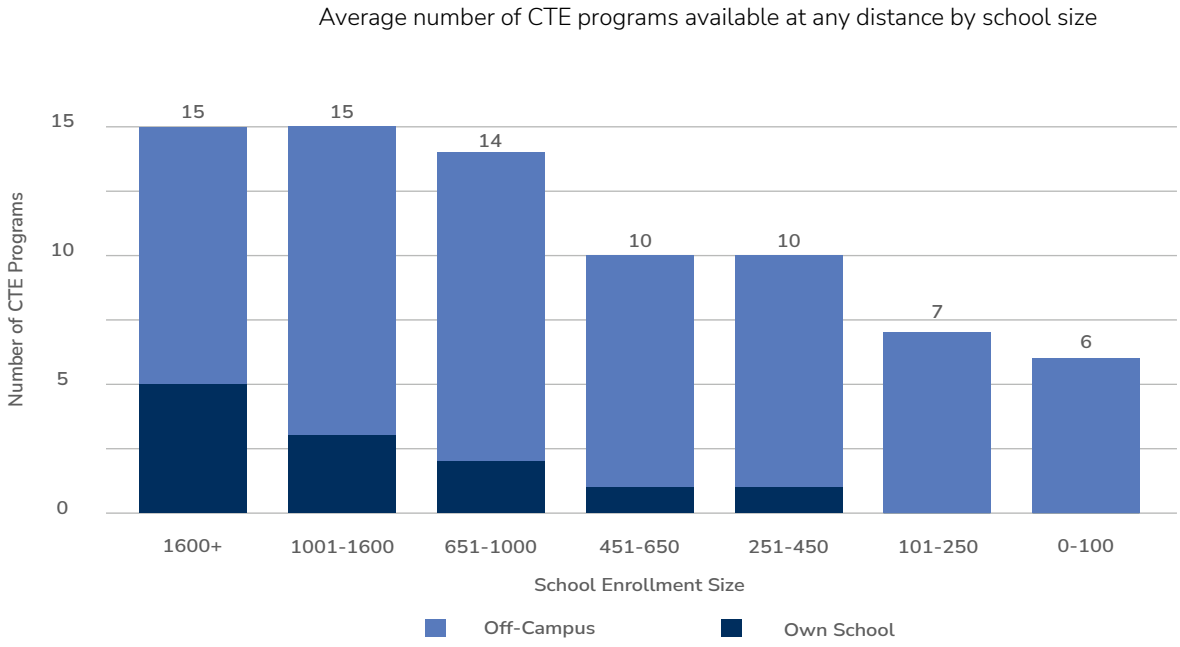
To be sure, the impact of academic services could be greater than that of an additional CTE program. How one evaluates this trade-off depends on various factors and we do not mean to suggest that one way of spending money is always preferable to the other. Rather, we seek to highlight the complex and nuanced environment in which CTE operates and in which educational leaders must make programmatic decisions.

FIGURE 6: Schools serving higher shares of economically disadvantaged students offer less access to CTE



As Figure 7 shows, students who attend larger schools generally can access more CTE programs, both in their own school and overall. Those who attend high schools with at least 1,000 students have approximately 50% more programs available compared with students who attend schools with roughly 500 students.

FIGURE 7: Larger schools offer more CTE access



Figures 5 through 7 consider one characteristic at a time. In doing so, they offer a straightforward description of the types of schools where CTE access varies. However, many of the variables we analyzed are correlated with one another. For example, rural schools typically enroll fewer students than more densely populated urban areas. Consequently, it is challenging on the surface to know whether one effect might mitigate – or even cancel out – another. Does geography still matter after we compare schools that are the same size?

To answer these types of questions, we utilized a statistical technique known as multiple regression analysis. Regression allows us to isolate the effect of a single variable from the rest. In short, we find that the patterns shown in Figures 5-8 remain significant even after statistically controlling for all the school characteristics simultaneously. See Table A1 in Appendix 3 for details.

CTE MILLAGES

What We Know about Districts with CTE Millages

By the time the students in our sample – 11th graders from the 2017-18 academic year – entered their expected 12th grade year during 2018-19, 38 of Michigan's 56 ISDs and/or Regional Educational Service Agencies (RESAs) levied CTE millages.[18] These districts accounted for approximately 55% of Michigan's high school students during that school year.

Although districts with CTE millages enroll a slight majority of all students, we find that they are less likely to enroll students from certain groups (see Table 3). For example, districts with CTE millages tend to enroll fewer Black and FRL-eligible students.

TABLE 3: The share of Black students enrolled in districts without CTE millages is twice as high as the share in districts with millages

Demographic characteristics of students who attend schools with and without CTE millages, by percent[19]		
	Student Demographics by District Type	
	Districts with CTE Millage	Districts without CTE Millage
Asian/Other	4%	3%
Black	14%	29%
Hispanic	8%	6%
White	81%	66%
FRL-Eligible	56%	61%
Students with Disabilities	20%	19%
Limited English Proficiency	3%	4%
Number of High Schools	679	484

These statistics raise a number of pertinent questions. First, what can we say about the overall relationship between CTE millages and program access? Given their popularity, millages are an important aspect of Michigan's education policy landscape and it is useful to understand their consequences. We can also ask if this policy – which standardizes enrollment eligibility and requires regional communities to pool their resources – diminishes opportunity gaps. Could a millage benefit low-income and students of color in districts that do not have one? Although we cannot comment on the causal effects of enacting a millage, we can compare program access in districts with and without millages to understand whether access is more equitable in one policy environment compared to another.

CTE Millages and Access Gaps

Since millage districts generally use these funds to operate countywide CTE centers, we focus on overall CTE availability as opposed to dividing this into a student's own school and programs that require travel.

We find that districts with millages offer more CTE programs on average. **The average student in a millage district has approximately 16 programs available while the average student without a millage can access 11**. Additionally, **we find that ISDs with millages exhibit smaller racial and socioeconomic access gaps in key program areas**.

Tables 4 and 5 show that all students have access to more programs across all career zones regardless of their race or socioeconomic status. The number of health, business, and information technology programs that the average student of color can access in ISDs with millages is nearly double the number in ISDs without millages. In fact, these increases are so large that students of color in ISDs with millages can access slightly more programs in these zones than White students on average. All students can access more than two additional engineering/manufacturing and industrial technology programs in ISDs with millages, and the racial gap decreases.

We find similar – though somewhat tempered – patterns along socioeconomic lines. Accounting for demographic characteristics and geography all at once tempers the magnitude and statistical significance of some of these findings, but the general trends hold. See Table A2 in Appendix 3 for detailed regression results.

TABLE 4: Average number of programs available at any distance by race and millage status

Arts & Communications		
	No Millage	Millage
White	0.9	1.1
Non-White	0.9	1.2

Business, Management, Marketing & Technology		
	No Millage	Millage
White	2.9	3.8
Non-White	2.3	4.2

Engineering/ Manufacturing & Industrial Technology		
	No Millage	Millage
White	3.9	6.2
Non-White	3.6	6.1

Health Sciences		
	No Millage	Millage
White	1.2	1.4
Non-White	0.8	1.5

Human Services		
	No Millage	Millage
White	1.9	2.7
Non-White	2.2	2.6

Natural Resources & Agriscience		
	No Millage	Millage
White	0.5	1
Non-White	0.2	0.7

TABLE 5: Average number of programs available at any distance by socioeconomic status (free or reduced-price lunch [FRL] eligibility) and millage status

Arts & Communications		
	No Millage	Millage
FRL ineligible	1	1.1
FRL eligible	0.8	1.1

Business, Management, Marketing & Technology		
	No Millage	Millage
FRL ineligible	3.2	4.2
FRL eligible	2.2	3.4

Engineering/ Manufacturing & Industrial Technology		
	No Millage	Millage
FRL ineligible	4.2	6.5
FRL eligible	3.5	5.8

Health Sciences		
	No Millage	Millage
FRL ineligible	1.2	1.4
FRL eligible	0.9	1.3

Human Services		
	No Millage	Millage
FRL ineligible	2	2.7
FRL eligible	1.9	2.6

Natural Resources & Agriscience		
	No Millage	Millage
FRL ineligible	0.5	0.9
FRL eligible	0.4	0.9

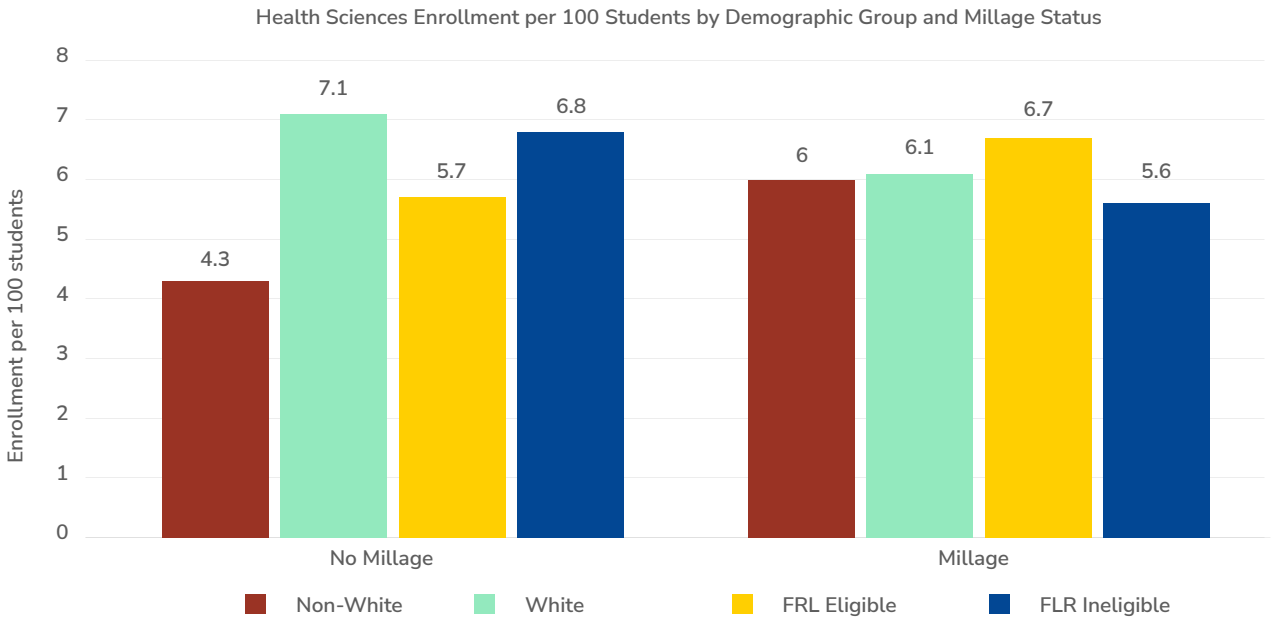
Program availability masks another important finding for the health sciences career zone that requires some context to understand. Although there are only two official health sciences programs in our data, a given health program at a school or CTE center can encompass various specializations offered in different sections throughout the day (e.g., nursing assistant and phlebotomy). Therefore, two schools that report the same number of health programs can actually offer different levels of access to CTE because one might offer more specializations than the other. Analyzing standardized enrollment rates helps to solve this problem by allowing us to see how many students schools are serving across their health programs.

Figure 8 shows the number of students who enrolled in a health sciences program per 100 students across four racial and socioeconomic groups in ISDs with and without millages. The height of each bar corresponds to the number of students who enrolled in a health program per 100 students in that demographic group.

A few key findings emerge about ISDs with millages:

- Participation among students of color is 40% higher.
- Participation is equal between White students and students of color.
- Economically disadvantaged students are more likely to participate than their more affluent peers.

FIGURE 8: Enrollment suggests that access to health sciences programs is more equitable in ISDs with CTE millages



We show these same enrollment measures for the remaining career zones in Appendix Table A3. We do not report on them here because in addition to measuring access, enrollment also captures student demand. Health sciences is a unique case given the aforementioned idiosyncrasy regarding the way in which programs appear in the data. Enrollment helps address an issue for this zone that is less relevant for the others.

We also find in analyses not shown here that racial and socioeconomic completion gaps are lower. In fact, FRL-eligible students complete health programs at a slightly higher rate than FRL-ineligible students in ISDs with millages.

These results suggest that millages accomplish multiple policy goals that should satisfy stakeholders with various priorities:

- First, by increasing the amount of funds to support CTE programs, they allow districts to offer students a larger set of CTE choices. On average, districts with millages offer more programs from all career zones. This means students have the option to begin exploring – and developing skills in – a wider variety of potential career paths during high school.
- Second, millages help ensure these opportunities are accessible to all students regardless of their race or socioeconomic background. By pooling resources across an entire ISD and decoupling access from ad hoc negotiations between districts. These policies reduce access gaps that we observe in other locations.

CTE AVAILABILITY, PARTICIPATION, AND COMPLETION

We conclude by examining the relationship between CTE availability, participation and completion. We examine both ease of access (i.e., whether students have a program in their school) and overall availability (i.e., the total number of options students have available). Our goal is to help administrators and other stakeholders better understand the relationship between CTE supply and demand, and the extent to which this varies by program type.

Figure 9 shows that there is a strong relationship between availability and participation. Schools that offer on-campus programs have higher CTE participation and completion rates. Even those that offer just one program exhibit participation and completion rates that are roughly twice as large as schools with no programs. Each additional on-campus program is associated with increases in participation and completion.

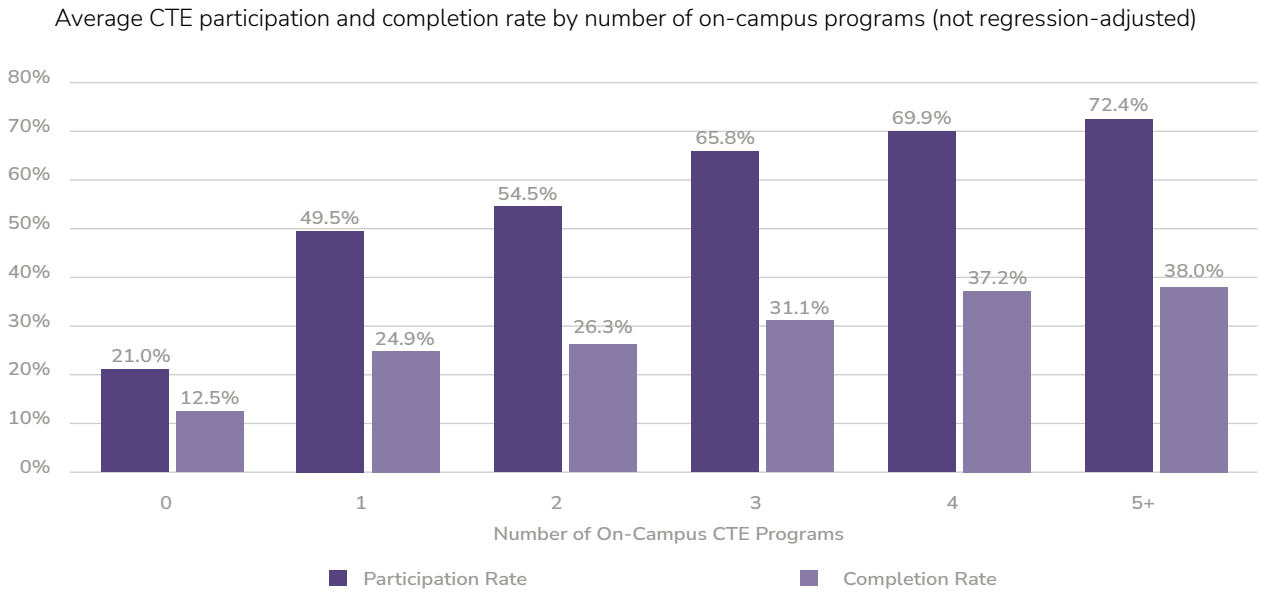
In order to focus on the impact of availability itself, we conduct analyses that control for other factors that might influence both CTE availability and participation levels. The following results compare schools within the same ISD, and also control for school demographics, geography, school type and neighborhood characteristics (i.e., income and employment). Table A3 in Appendix 3 shows the details of the statistical analysis. Here we discuss the key findings:

- Students are much more likely to participate in CTE if they have access in their own school. Schools that offer CTE on campus exhibit participation rates that are 27 percentage points higher, all else equal. This is more than double the participation rate of schools that do not offer CTE.
- Each additional on-campus program boosts participation rates by approximately 3.9 percentage points. The total number of programs that are available to students has a smaller effect: each additional program at any distance is associated with a one-percentage point increase in a school's CTE participation rate.
- We estimate that a school with at least one on-campus program will exhibit a completion rate that is approximately seven percentage points higher than an observably similar school without any CTE. This represents a 56% increase.[20]
- Every additional on-campus program is associated with a 2.9-percentage point increase in completion rates; each additional program accessible at any distance boosts completion rates by approximately seven-tenths of a percentage point.

Beneath these general patterns, we find that the relationship between participation and direct availability varies by program type. Students are more likely to enroll in programs within four career zones if one is available at their school: business, management, and technology; engineering/manufacturing and industrial technology; human services; and natural resources and agriscience. Enrollment in all career zones generally increases with each additional program that is available – regardless of where it is located.

We find similar results for completion rates. See Table A4 in Appendix 3 for full results.

FIGURE 9: CTE participation and completion rates are higher in schools that offer more on-campus programs



DISCUSSION AND POLICY IMPLICATIONS

Recent research indicates that CTE participation is associated with a host of academic benefits. However, our analyses suggest that access to these programs is not equitable. Black, Hispanic, and socioeconomically disadvantaged students have fewer CTE options available on average. There are seemingly two main factors driving these disparities.

First, students of color and socioeconomically disadvantaged students are more likely to attend charter and so-called "alternative" schools. Although students who attend these schools are technically eligible to participate in CTE programs, there are clearly barriers that prevent them from doing so in practice (see Figure 4). It is possible that some of these schools (charters in particular) emphasize college preparedness at the expense of vocational training. Alternatively, some of these schools may provide other career pathway training that are not state-recognized CTE programs and thus do not appear in our data.

Second, these same groups of students are less likely to live in ISDs that levy a CTE millage, which our results indicate increases the total number of CTE programs available for all students. Without this extra revenue to operate shared, centralized programs, districts must rely on their general per-pupil funds and any funds their programs generate through the aforementioned Section 61 School Aid Act state funds to pay for CTE. This can be a financial burden for economically disadvantaged districts. Other social factors may also impose de facto impediments to students attending programs to which they might otherwise have access. For example, we have heard anecdotes from various administrators that students' sense of belonging influences whether they will travel to participate in a program. That is, students of color are less likely to enroll in a program if they must travel to a predominantly White campus to do so.

Given these disparities, how might we equalize CTE access throughout Michigan?

We encourage ISDs without millages to explore this option. Kalamazoo RESA and Saginaw ISD each recently passed millage initiatives and provide evidence that educational leaders can unite their communities around this issue.

Asking a community to impose additional taxes on itself is of course no small task and requires strategic outreach. CTE administrators interested in pursuing this option should consult labor market projections for their part of the state and consider how they might use the funds to stand up programs that will prepare their students for the jobs of tomorrow.[21] Indeed, the Youth Policy Lab conducted such an analysis on behalf of KRESA as part of its millage campaign.[22]

Not all ISDs will be able to levy a new CTE millage. Still, we encourage these remaining districts to examine CTE enrollment patterns throughout their local districts and identify creative solutions to address opportunity gaps. This may involve providing transportation where none currently exists, standardizing bell schedules across campuses to ensure traveling students miss as little class time as possible, or similar targeted interventions.

Of course, districts face additional constraints beyond funding that determine which and how many programs they can offer. One key limiting factor is the ability to hire qualified teachers. Michigan CTE instructors are required to demonstrate a record of 4,000 hours of industry experience in a related field within the last 10 years at the time of hire. In other words, schools must find experienced professionals who want to teach rather than work in industry. Depending on the field, the difference in earning potential can make it challenging to hire qualified instructors. This can be especially challenging for rural districts that must recruit teachers to remote areas.

Other states provide examples for addressing these challenges and making it easier to recruit CTE teachers. For example, Tennessee allows industry experience to count as years of teaching when calculating salary levels. This provides a financial incentive for experienced professionals to pivot to teaching without having to start at the bottom of the compensation ladder. Alabama also attempts to attract industry professionals by offering a statewide grant that supplements salaries in certain career clusters.[23]

However districts choose to proceed, our work suggests that more students will readily participate in CTE if given the access and opportunity.

APPENDIX 1 – DATA

The data used in preparing this report are from the Michigan Education Data Center (MEDC) at the University of Michigan Ford School of Public Policy Education Policy Initiative (EPI). The underlying student-level longitudinal data files are provided by the Michigan Department of Technology Management and Budget (DTMB) Center for Educational Performance and Information's (CEPI) Michigan Student Data System (MSDS), the state Office of Career and Technical Education (OCTE), and the Department of Education's Common Core of Data (CCD).

Analyses conducted for this policy brief primarily used student-level data that have been aggregated to the school-level. The student-level data include standard demographic and enrollment information, as well as information on students' participation in Career and Technical Education (CTE) programs, which also are used in the construction of availability measures described below. Additionally, information on school size, urbanicity, type, and other school descriptors from the CCD. As well as averages of student neighborhood (census block group) characteristics for buildings, districts, and counties covering educational attainment, average income, employment outcomes, and rurality from the American Community Survey. Michigan county voting outcomes are from the Michigan Secretary of State. Information on Intermediate School District millages that fund Career and Technical Education are from the Michigan House Fiscal Agency.

The Career and Technical Education participation data, along with geolocation information on the building in which CTE programs are located, are used to create the CTE availability measures used in this brief. A program is deemed "available" to a student if any of four conditions are met: 1.) The program is offered in their own school. 2.) At least 5 students from your school (across years) took the program. 3.) At least 2 students from your school (across years) took the program and either: a.) The students make up at least 50% of enrollments, or b.) Most schools only send 1 or 2 students to the program. 4.) The program is in a tech center that serves the student's district. In the case of conditions 2.) – 4.), travel times are calculated between the student's own school and the building offering the program using the two buildings' coordinates and the free HERE.com API.

The underlying student-level data include all Michigan public school students who were first enrolled in 11th grade during the 2017-2018 school year. The full sample of student data aggregated to the school-level consists of 1,163 unique buildings. In most cases the size or type of school (i.e. charter, or non-traditional) is not restricted in the sample; however, it is often controlled for in analyses. When the sample is restricted to non-charter or traditional schools only it is noted in either table notes or the body of the text.

APPENDIX 2 – ANALYSIS & METHODOLOGY

Figure 1 Average total CTE availability by student demographic group: This figure compares CTE access across racial and socioeconomic groups. The total height of each bar (i.e., the combined blue and orange sections) is equal to the weighted average of the number of programs available at each school where for each average the weight used is the number of students in that demographic group. The blue section of each bar reports the average number of programs that are accessible within each group's schools; the orange section reports the average number of programs that are accessible outside of each group's home schools. The gray bar reports the average number of CTE programs accessible at any distance among all students.

Figure 2 Share of students with access to different numbers of programs at any distance by SES: This figure reports the fraction of students with access to six levels of CTE availability by FRL eligibility status. The height of each bar is equal to the share of students within the associated group that has access to the corresponding number of programs. Bars are color-coded to represent different numbers of programs.

Figure 3 Share of students with access to different numbers of programs at any distance by race: This figure reports the fraction of students with access to six levels of CTE availability by racial group. The height of each bar is equal to the share of students within the associated group that has access to the corresponding number of programs. Bars are color-coded to represent different numbers of programs.

Figure 4 Share of students with at least one CTE program in their school by demographic group: This figure reports the percentage of students from various demographic groups with at least one CTE program housed in their home school. Each vertical bar corresponds to a different demographic group and the horizontal orange bar represents the share of all students with at least one program in their home school.

Table 2 Average number of programs available by program type: This table displays aggregate CTE access and access broken down by program group. The top row shows the share of all students who attend a school that offers at least one on-campus program of the corresponding career zone. The bottom row shows the enrollment-weighted average number of programs that students can access at any distance from their school (i.e., both on campus and via travel).

Figure 5 Access to CTE at any distance by school type: This figure reports the fraction of students with access to six levels of CTE availability by school type classification. The height of each bar is equal to the share of students within the associated school type with access to the corresponding number of programs. Bars are color-coded to represent different numbers of programs.

Figure 6 Average number of CTE programs available by FRL rate: This figure shows total CTE availability across schools with different shares of FRL eligible students, broken down by within-school access and access via travel. Each school is assigned to one of five bins according to its share of students who qualify for FRL: 0-20%, 20-40%, 40-60%, 60-80%, and 80-100%. The total height of each bar shows the enrollment-weighted average number of programs accessible to students who attend schools with the corresponding level of FRL eligibility. This average is equal to the total number of programs accessible across all schools in the corresponding FRL bin divided by the total number of schools in the same FRL bin. The blue section of each bar shows the average number of programs that are available within schools; the red portion shows programs that are accessible via travel.

Figure 7 Average number of CTE programs available by school size: This figure shows total CTE availability across schools with different enrollment sizes, broken down by within-school access and access via travel. Each school is assigned to one of five bins according to the size of its student body: 0-100, 101-250, 251-450, 451-650, 651-1000, 1001-1600, 1600 and above. The total height of each bar shows the enrollment-weighted average number of programs accessible to students who attend schools with the corresponding enrollment range. This average is equal to the total number of programs accessible across all schools in the corresponding enrollment bin divided by the total number of schools in the same enrollment bin. The blue section of each bar shows the average number of programs that are available within schools; the red portion shows programs that are accessible via travel.

Table 3 Demographic characteristics of schools with and without CTE millages: This table reports the share of students who belong to various racial, socioeconomic, and support service groups by millage classification. Each cell is equal to the average share of students who belong to the relevant demographic characteristic among all schools in the corresponding delivery model (i.e., millage or no millage). Each reported average is weighted by school-level enrollment.

Tables 4 and 5 Average number of programs available at any distance by race, socioeconomic status, and millage status: These tables show access to six groups of CTE programs in districts with and without CTE millages, by race and FRL eligibility. See the second equation in Appendix 3 for a detailed explanation of how we produced these numbers.

Figure 8 Health sciences enrollment per 100 students by demographic group and millage status: This figure shows the average number of students per 100 students in four demographic groups who ever enrolled in a health sciences program. Averages are calculated at the student level across all students in each demographic group, separately in ISDs with and without millages.

Figure 9 Average CTE participation rate at schools with different numbers of programs available on campus: This figure shows CTE participation and completion rates in schools that offer different numbers of on-campus CTE programs: none, one, two, three, four, and five or more. Each pair of blue and gray bars represents all schools that offered the corresponding number of on-campus programs. The height of each bar represents the enrollment-weighted average share of all students who participated in (blue) or completed (gray) a CTE program during high school.

APPENDIX 3 – METHODOLOGY

In the section "What types of schools offer more (or fewer) CTE programs?" we estimate equations of the form:

$$Programs_{sd}=\beta_0+\beta_1 Enroll_{sd}+\beta_2 Poverty_{sd}+\delta X_{sd}+\lambda_d+\varepsilon_{sd}$$

$Programs_{sd}$ is either the number of programs available in school, s, or the number of programs available outside of school, s, to students enrolled in school, s. $Enroll_{sd}$ and $Poverty_{sd}$ are outcomes of interest: school enrollment and share of students who are socioeconomically disadvantaged. X_{sd} are school-level controls and λ_d are ISD fixed-effects. Estimates of the coefficients of interest ($\hat{\beta}_1$ and $\hat{\beta}_2$) are reported in Table 1.

In the section "CTE Millages: Differences in Overall Program Availability and Program Types" we estimate equations of the form:

$$Programs_{isd}=\beta_0+\beta_1 Millage_{sd}+\beta_2 Interest_{isd}+\beta_3 Millage_{sd}\times Interest_{isd}+\delta X_{sd}+\varepsilon_{sd}$$

$Programs_{isd}$ is the number of programs available to student, i, within any distance. $Millage_{sd}$ indicators whether the student is enrolled in a school in an ISD with a millage, and $Interest_{isd}$ is the independent variable of interest, and $Millage_{sd}\times Interest_{isd}$ is their interaction term. X_{sd} are additional controls, including interactions with the millage indicator. Estimates of the coefficients of interest ($\hat{\beta}_0$, $\hat{\beta}_1$, $\hat{\beta}_2$ and $\hat{\beta}_3$) are reported in Table A1 and these estimates are used in predicting the availability for groups reported in Table 4 & 5.

In the section "CTE Availability, Participation, and Completion" we estimate equations of the form:

$$Outcome_{sd}=\beta_0+\beta_1 Any\_Own_{sd}+\beta_2 \#\_Own_{sd}+\beta_3 \#\_Outside_{sd}+\delta X_{sd}+\lambda_d+\varepsilon_{sd}$$

$Outcome_{sd}$ is either the CTE participation or completion rate of students in school, s. Any_Own_{sd} is an indicator for whether any CTE program is available within school, s. $\#\_Own_{sd}$ is the number of programs available within school, s, and $\#\_Outside_{sd}$ is the number of programs available outside of school, s, to students enrolled in school, s. X_{sd} are school-level controls and λ_d are ISD fixed-effects. Estimates of the coefficients of interest ($\hat{\beta}_1$, $\hat{\beta}_2$, and $\hat{\beta}_3$) are reported in Table 3.

Table A1: School characteristics and CTE availability

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Programs at own school	Programs at own school	Programs at own school	Programs at own school	Programs at any distance	Programs at any distance	Programs at any distance	Programs at any distance
Total school enrollment (1000s)	2.507***		2.102***	2.252***	3.624***		2.475***	2.001***
	(0.350)		(0.346)	(0.298)	(0.805)		(0.594)	(0.501)
Percent of student body poor		-5.270***	-1.905	-2.453*		-12.701***	-8.117***	-6.875***
		(0.599)	(1.326)	(1.259)		(1.076)	(2.206)	(2.072)
N	1163	1163	1163	1163	1163	1163	1163	1163
r2	0.259	0.147	0.397	0.548	0.114	0.180	0.607	0.738
Controls	No	No	Yes	Yes	No	No	Yes	Yes
ISD FE	No	No	No	Yes	No	No	No	Yes
Outcome Mean	2.491	2.491	2.491	2.491	12.71	12.71	12.71	12.71

Notes: The results in this table are from school-level regressions weighted by school enrollment. The outcomes are number CTE programs available to students at their own school or at a school within any distance. Controls include school demographics, test scores, geography, school type, presence of millage, neighborhood characteristics (i.e., income and employment), and county 2020 voting outcomes. Fixed effects are at the ISD level when included.

Table A2: Millages and CTE availability by program type

	(1) Art/Comm	(2) Art/Comm	(3) Art/Comm	(4) Bus/Tech	(5) Bus/Tech	(6) Bus/Tech	(7) Eng/Mfg	(8) Eng/Mfg	(9) Eng/Mfg	(10) Health
Millage	0.194**	0.152*	0.300	0.932***	1.085***	0.490	2.279***	2.286***	2.421***	0.145
	(0.077)	(0.080)	(0.210)	(0.232)	(0.261)	(0.573)	(0.249)	(0.253)	(0.592)	(0.091)
Non-White	-0.020		0.061	-0.615***		-0.268	-0.314		0.171	-0.410***
	(0.073)		(0.077)	(0.215)		(0.179)	(0.301)		(0.272)	(0.084)
Millage X Non-white	0.079		-0.016	1.030***		0.511**	0.174		-0.316	0.533***
	(0.095)		(0.091)	(0.289)		(0.242)	(0.351)		(0.319)	(0.116)
FRL		-0.182***	-0.095		-0.937***	-0.473***		-0.734***	-0.366**	
		(0.056)	(0.060)		(0.147)	(0.129)		(0.187)	(0.178)	
Millage X FRL		0.116*	0.089		0.141	0.173		0.041	0.077	
		(0.063)	(0.067)		(0.203)	(0.178)		(0.217)	(0.210)	
Constant	0.900***	0.982***	0.512***	2.893***	3.154***	1.400***	3.935***	4.192***	2.229***	1.208***
	(0.065)	(0.066)	(0.145)	(0.152)	(0.171)	(0.341)	(0.213)	(0.214)	(0.442)	(0.073)
N	114552	114551	114551	114552	114551	114551	114552	114551	114551	114552
r2	0.0201	0.0272	0.114	0.0735	0.0971	0.394	0.185	0.200	0.309	0.0446
Controls	No	No	Yes	No	No	Yes	No	No	Yes	No

Notes: The results in this table are from student-level regressions. The outcome is programs available within any distance for the groupings listed in the column headers. Independent variables include student demographics, school enrollment, and school urbanicity. All independent variables are also interacted with whether the student attended a school in an ISD with a millage in 2018.

Table A2: Millages and CTE availability by program type (cont.d)

	(10) Health	(11) Health	(12) Health	(13) Services	(14) Services	(15) Services	(16) Nat/Agr	(17) Nat/Agr	(18) Nat/Agr
Millage	0.145	0.200**	0.256	0.806***	0.635***	0.831**	0.424***	0.402***	-0.036
	(0.091)	(0.099)	(0.260)	(0.147)	(0.153)	(0.415)	(0.085)	(0.091)	(0.260)
Non-White	-0.410***		-0.287***	0.305*		0.339**	-0.310***		-0.229**
	(0.084)		(0.069)	(0.171)		(0.143)	(0.063)		(0.091)
Millage X Non-white	0.533***		0.368***	-0.356*		-0.432**	0.086		0.109
	(0.116)		(0.096)	(0.194)		(0.172)	(0.087)		(0.105)
FRL		-0.276***	-0.107**		-0.175	-0.159*		-0.177***	-0.107*
		(0.063)	(0.046)		(0.115)	(0.091)		(0.057)	(0.059)
Millage X FRL		0.187**	0.075		0.133	0.220**		0.150**	0.138**
		(0.080)	(0.063)		(0.129)	(0.111)		(0.066)	(0.067)
Constant	1.208***	1.214***	0.889***	1.870***	2.049***	1.469***	0.540***	0.530***	0.549**
	(0.073)	(0.077)	(0.160)	(0.124)	(0.127)	(0.271)	(0.074)	(0.079)	(0.227)
N	114552	114551	114551	114552	114551	114551	114552	114551	114551
r2	0.0446	0.0356	0.0921	0.0579	0.0555	0.114	0.103	0.0881	0.128
Controls	No	No	Yes	No	No	Yes	No	No	Yes

Notes: The results in this table are from student-level regressions. The outcome is programs available within any distance for the groupings listed in the column headers. Independent variables include student demographics, school enrollment, and school urbanicity. All independent variables are also interacted with whether the student attended a school in an ISD with a millage in 2018.

Table A3:

Participation Rate in Career Zone X Per 100 Students in Group Y							
Group	# of Students	Arts & Communications	Business, Management, Marketing & Technology	Engineering, Manufacturing & Industrial Technology	Health Sciences	Human Services	Natural Resources & Agriscience
FRL Ineligible - No Millage	27265	3.6	24.9	11.6	6.8	4.7	2.3
FRL Eligible - No Millage	25393	3.1	15.8	10.1	5.7	6.4	2.0
FRL Ineligible - Millage	35920	2.5	21.6	11.3	5.6	4.0	3.7
FRL Eligible - Millage	25973	3.0	14.6	12.1	6.7	6.4	3.7
Nonwhite - No Millage	16266	4.1	15.1	5.9	4.3	7.4	0.7
White - No Millage	36392	3.1	22.9	13.1	7.1	4.7	2.8
Nonwhite - Millage	12025	3.3	18.7	7.0	6.0	4.7	1.2
White - Millage	49868	2.6	18.6	12.7	6.1	5.1	4.3

Completion Rate in Career Zone X Per 100 Students in Group Y							
Group	# of Students	Arts & Communications	Business, Management, Marketing & Technology	Engineering, Manufacturing & Industrial Technology	Health Sciences	Human Services	Natural Resources & Agriscience
FRL Ineligible - No Millage	27265	2.2	13.7	5.9	4.7	2.6	1.3
FRL Eligible - No Millage	25393	1.7	7.3	4.1	3.7	2.5	0.8
FRL Ineligible - Millage	35920	1.6	9.8	6.6	4.5	2.6	1.5
FRL Eligible - Millage	25973	1.5	5.9	5.7	4.8	3.5	1.4
Nonwhite - No Millage	16266	2.2	6.5	2.3	2.9	2.7	0.2
White - No Millage	36392	1.9	12.4	6.2	4.8	2.5	1.4
Nonwhite - Millage	12025	1.5	7.4	3.0	4.5	2.5	0.4
White - Millage	49868	1.6	8.4	7.0	4.7	3.1	1.7

Table A4: CTE Availability, Participation and Completion

	(1) Participation All	(2) Completion All	(3) Participation Art/Comm	(4) Completion Art/Comm	(5) Participation Bus/Tech	(6) Completion Bus/Tech	(7) Participation Eng/Mfg	(8) Completion Eng/Mfg
Any Program at Own School	0.268***	0.069***	0.017	0.021	0.209***	0.068***	0.070***	0.012
	(0.021)	(0.015)	(0.046)	(0.031)	(0.021)	(0.014)	(0.014)	(0.009)
# of programs at Own School	0.039***	0.029***	0.089**	0.031	0.044***	0.028***	0.028***	0.021***
	(0.004)	(0.003)	(0.041)	(0.027)	(0.007)	(0.005)	(0.005)	(0.004)
# of program outside of Own School	0.009***	0.007***	0.012***	0.005*	0.018***	0.007*	0.006***	0.004***
	(0.002)	(0.001)	(0.004)	(0.003)	(0.005)	(0.004)	(0.002)	(0.001)
N	1162	1162	1163	1163	1163	1163	1163	1163
r2	0.782	0.657	0.553	0.440	0.796	0.651	0.636	0.554
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ISD FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Outcome Mean	0.447	0.236	0.0281	0.0163	0.173	0.0833	0.106	0.0543

Notes: The results in this table are from school-level regressions weighted by school enrollment. The outcomes are school CTE participation and completion rates in each CTE grouping and overall. Controls include school demographics, geography, school type, presence of millage, neighborhood characteristics (i.e., income and employment), county 2020 voting outcomes, and ISD fixed effects.

Table A4: CTE Availability, Participation and Completion (cont.d)

	(9) Participation Health	(10) Completion Health	(11) Participation Services	(12) Completion Services	(13) Participation Nat/Agr	(14) Completion Nat/Agr
Any Program at Own School	0.032	-0.029	0.080***	0.030**	0.156*	0.045
	(0.024)	(0.020)	(0.026)	(0.015)	(0.083)	(0.038)
# of programs at Own School	0.070***	0.096***	0.027*	0.017**	0.089	0.028
	(0.014)	(0.013)	(0.015)	(0.009)	(0.072)	(0.033)
# of program outside of Own School	0.010***	0.010***	0.016***	0.009***	0.019***	0.008***
	(0.004)	(0.003)	(0.003)	(0.002)	(0.004)	(0.002)
N	1163	1163	1163	1163	1163	1163
r2	0.547	0.503	0.646	0.473	0.659	0.481
Controls	Yes	Yes	Yes	Yes	Yes	Yes
ISD FE	Yes	Yes	Yes	Yes	Yes	Yes
Outcome Mean	0.0580	0.0422	0.0511	0.0266	0.0308	0.0131

Notes: The results in this table are from school-level regressions weighted by school enrollment. The outcomes are school CTE participation and completion rates in each CTE grouping and overall. Controls include school demographics, geography, school type, presence of millage, neighborhood characteristics (i.e., income and employment), county 2020 voting outcomes, and ISD fixed effects.

APPENDIX 4 – CAREER CLUSTER GROUPINGS

Career Cluster	Career Zone
Arts, A/V Technology & Communications	Arts and Communications
Business, Management & Administration	Business, Management, Marketing and Technology
Finance	Business, Management, Marketing and Technology
Information Technology	Business, Management, Marketing and Technology
Marketing	Business, Management, Marketing and Technology
Architecture & Construction	Engineering/Manufacturing and Industrial Technology
Energy	Engineering/Manufacturing and Industrial Technology
Manufacturing	Engineering/Manufacturing and Industrial Technology
Science, Technology, Engineering and Mathematics	Engineering/Manufacturing and Industrial Technology
Transportation, Distribution & Logistics	Engineering/Manufacturing and Industrial Technology
Health Science	Health Sciences
Education & Training	Human Services
Government & Public Administration	Human Services
Hospitality & Tourism	Human Services
Human Services	Human Services
Law, Public Safety, Corrections & Security	Human Services
Agriculture, Food & Natural Resources	Natural Resources and Agriscience

DISCLAIMER

This research result used data 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 and are not endorsed by, or reflect the views or positions of, grantors, MDE and CEPI or any employee thereof.

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11 ISDs are school districts that fit between local districts and the state Department of Education in Michigan's education administration organizational structure. They have boards and superintendents similar to local districts. In addition to CTE, ISDs help deliver early childhood intervention services and services for students with disabilities or mental health needs.

12 All state-approved CTE programs are eligible to generate funds through sections 61a(1) and 61b of the School Aid Act. Sixty percent of 61a(1) funds are allocated based on state priorities, which include student progress, program costs, and program rank as determined by job openings, placements, and earnings in associated occupations. The remaining 40% are allocated according to local priorities.

13 We chose to use this cohort because it was largely unaffected by the COVID-19 pandemic. For example, we heard from various administrators that CTE enrollment declined during the height of the pandemic.

14 https://www.mischooldata.org/cte-programs-offered/

15 In order to not miss very small programs, we also consider a program available if at least two students from the student's home school have enrolled in that program in the past and most schools only send one or two students to that program.

16 This change will alter some statistics such as CTE participation and completion rates that we show later. However, we weight our analyses in this report by school size, so charter and alternative schools contribute less to our calculations since they typically enroll fewer students.

17 For a summary of the relative prevalence of social service provision in high- and low-poverty high schools, see: https://www2.ed.gov/rschstat/eval/high-school/social-services.pdf.

18 Four local educational agencies opt out of their parent ISD's millage: Lansing Public School District (Ingham ISD), Lakewood Public Schools (Ionia ISD), Greenville Public Schools (Montcalm Area ISD), and Tri County Area Schools (Montcalm Area ISD).

19 Racial categories in this table do not sum to 100% due to the nature of Hispanic ethnicity in our data. Some students are identified as Hispanic alone, while others include a Black or White racial identity as well.

20 Note that we define the completion rate as the share of all students at a given school who ultimately complete a CTE program. This is distinct from the share of CTE participants who go on to complete a program.

21 https://milmi.org/Publication/Research/Regional-Career-Outlooks-through-2028

22 https://youthpolicylab.umich.edu/publications/kresa-cte-labor-market-analysis/

23 For more information on these and other CTE teacher recruitment strategies, see "The State of Career Technical Education: Increasing Access to Industry Experts in High Schools" by Advance CTE (2016).

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Support the Youth Policy Lab's effort to use data for good.

University of Michigan Youth Policy Lab
5201 Institute for Social Research
426 Thompson St
Ann Arbor, MI 48104

734-647-8829
@YouthPolicyLab
youthpolicylab.umich.edu

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About the Authors

Brian A. Jacob is the Walter H. Annenberg Professor of Education Policy and Professor of Economics at the University of Michigan. His current research focuses on urban school reform, youth workforce development and program evaluation.

Jeremy Guardiola is a project manager with the Youth Policy Lab. He focuses on workforce development programs and policies.

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.