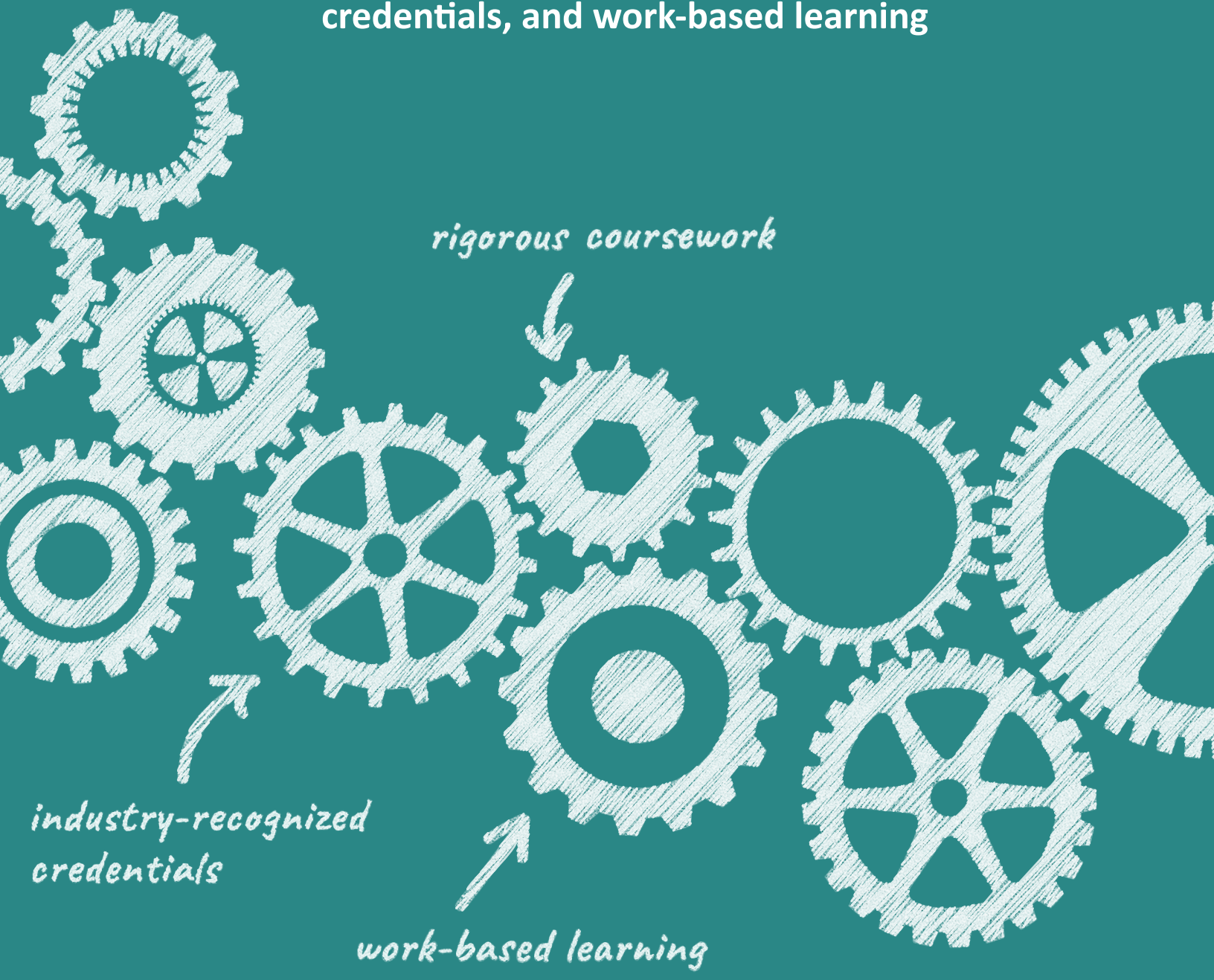
The state of career-and-technical education in Ohio

An analysis of coursework, industry-recognized credentials, and work-based learning



By Jay Plasman

July 2025

THOMAS B. FORDHAM INSTITUTE
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About the author

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Foreword and summary

By Aaron Churchill

Ohio is on a roll, with economic development gaining speed across the state. Earlier this year, Anduril Industries—a California-based technology company—announced that it will build an advanced manufacturing facility in Pickaway County. Intel is in the midst of constructing a massive semiconductor production site near Columbus. Healthcare providers have been expanding, while oil and gas development continues to boom in Eastern Ohio.

At a press event trumpeting the expansion of a Ford plant in Avon Lake, Governor DeWine emphasized the need for a strong workforce to attract investment. The *Akron Beacon Journal* noted:

> The key, however, always has been Ohio's talented workforce, DeWine said. "The controlling factor always is, are the workers there? Are there workers with the skill set? Are there workers who can do the job?"

The governor is right. If Ohio is to capitalize on the opportunities for growth and prosperity that lie ahead, the state must have a highly skilled workforce. And developing that talent pipeline begins in today's K–12 schools.

Ensuring that every student exits high school proficient in math and reading remains the core talent imperative—something that Ohio still has much to do to accomplish. Yet above and beyond a solid academic foundation, schools must also provide preparation aligned with students' post-secondary career plans, including specialized/advanced coursework and opportunities for on-the-job training. For the two in five students who head directly into the workforce, schools must help them build the career-technical skills needed to secure good-paying jobs right out of high school.

Recognizing the importance of readying young people for career success, Ohio has recently undertaken efforts to elevate career-technical education (CTE). These initiatives include building career-focused pathways to high school graduation, providing financial incentives for high-quality CTE programs, and supporting work-based learning. Just this spring, Governor DeWine proposed in his budget recommendations a new requirement that every student create an individualized career plan during high school.

As this push continues, it's important to step back and ask some basic questions. Just how many students participate in CTE courses? Or attain industry-recognized credentials? Complete an on-the-job experience? What career fields are most and least represented? Are any particular student groups getting left behind? Overall, what type of progress is Ohio making to promote high-quality programs, and how might policymakers keep improving it?

Authored by Jay Plasman of The Ohio State University, this report provides a big-picture overview of CTE in the Buckeye State. It analyzes recent trends in participation, as well as patterns by career field, key student groups, and type of school. Some of the data presented here are publicly available and parts of the puzzle have been assembled in such publications by Excel*in*Ed, Ohio Excels, and in earlier Fordham pieces. Yet we know of no consolidated review, and such a report could be helpful to state and local leaders seeking a clearer understanding of this area of education.[1]

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1 This report does *not* contain a rigorous evaluation of CTE programs. However, a forthcoming study by Dr. Plasman will tackle questions about impacts on students, including their early-career workforce outcomes.

The present report focuses on key measures of CTE participation: coursework, credential attainment, and work-based learning. Here's a summary of the main findings.

1. Coursework participation is indeed on the rise. Roughly one in four Ohio high school students completed at least one CTE course during the 2022–23 school year, up from one in six during 2014–15. In terms of actual headcounts, 136,692 students completed a course in 2022–23 versus 97,989 students in 2014–15.

2. One-third of Ohio students attain CTE "concentrator" status by graduation. Among the class of 2023, 44,246 students—about one in three—completed two or more courses in a single career pathway, thus achieving the federally defined "concentrator" status. The number of concentrators has risen when compared to the class of 2020 when 36,021 students met this coursetaking benchmark.

3. Attainment of industry-recognized credentials has soared in recent years. In 2021–22, Ohio high school students earned 69,883 credentials, while just 14,500 were earned in 2014–15—a nearly fivefold increase. This count includes any credential that is approved for the purpose of meeting certain elements of state graduation requirements.

4. Attainment of more-selective IWIP credentials has also risen significantly. Recognizing that not all credentials are of equal value, state lawmakers recently created the Innovative Workforce Incentive Program (IWIP), which provides additional funding to schools when students earn high-priority credentials in select career fields such as IT or manufacturing. The number of IWIP credentials earned rose from 3,031 in 2019–20 to 19,175 in 2022–23.

5. Participation in work-based learning ticked upward in the most recent year. In the class of 2023, 12,567 students, or about one in ten, accumulated more than 250 hours of work-based learning experience (e.g. apprenticeships or internships) during high school. This represents an increase compared to the roughly 8,000 students in the class of 2022 who met the hour threshold.

It's clear that more and more Ohio students are availing themselves of career-technical learning opportunities. But not everything is rosy in this realm—and the study also reveals several concerning patterns—and areas ripe for attention. They include the following:

1. Several high-tech career pathways are underrepresented in CTE coursetaking. The state categorizes courses into sixteen career fields, which get subdivided into forty-six career pathways. These are akin to college majors, as they specify state-approved CTE courses that students may take in a specific domain.[2] As shown in the table below, the three pathways in which students most frequently concentrate are agribusiness and production, engineering and design, and allied health and nursing. However, the bottom section displays five high-tech pathways in which very few young Ohioans concentrate, whether due to meager school offerings or lack of interest. These data suggest significant room to grow programs in high-tech pathways.

2 For an example of the agricultural pathways and course descriptions, see here.

Table A: Most frequent pathways of CTE concentration (top) and underutilized high-tech pathways (bottom)

Career pathway	Career field	*N* students concentrating in pathway	% of total concentrators
Agribusiness and production systems	Agriculture	13,865	15.4%
Engineering and design	Engineering	8,125	9.0%
Allied health and nursing	Health science	7,688	8.5%
Programming and software development	IT	1,615	1.8%
Cybersecurity	IT	879	1.0%
Biotechnology for food, plant, and animal	Agriculture	624	0.7%
Health information management services	Health science	121	0.1%
Robotics	Engineering	56	0.1%

2. More selective IWIP credentials represent a small fraction of total credentials-earned. In 2022–23, just 16 percent of all credentials-earned in Ohio were high-priority IWIP credentials. Hence, the vast majority of credentials—although qualifying for graduation purposes—are in lower-demand career fields and/or more general certifications not closely tied to particular professions. Here again we see ample scope for growth in helping students prepare for high-wage, in-demand careers.

3. Specialized career centers are more likely to provide programs in high-priority career fields. In 2022–23, a slight majority of students (51 percent) attending specialized career centers met "concentrator" status by taking coursework (but may not have earned a credential) in selective career fields,[3] while just 40 percent of students who participated in CTE at "regular" traditional high schools did so. In terms of IWIP attainment, 8 percent of students attending career centers earned these high-priority credentials, while just 2 percent of students enrolled in traditional high schools did so.

4. Low-income and Black students are underrepresented in specialized career centers. Such students were more apt to participate in CTE at traditional high schools, which are less likely to offer high-priority CTE programs, as identified under IWIP. Alongside data showing a proliferation of lower-level credentials in Ohio's major urban districts (presented elsewhere), this should raise concerns about equitable access to rigorous CTE for students from disadvantaged backgrounds.

5. Too few students receive on-the-job experience during high school. Just 47 percent of the CTE concentrators in the class of 2023 participated in any amount of work-based learning—at least one hour—and only 26 percent achieved the 250-hour mark.

* * *

3 A selective career field is one with a credential that is eligible for IWIP.

Based on these data, we conclude with three recommendations for Ohio policymakers.

First, keep pushing for high-quality, high-priority CTE. One area in need of immediate attention is the rigor of the career-tech-focused graduation pathway, which currently steers students into accumulating lower-level credentials as a shortcut to graduation. Instead, lawmakers should implement a graduation pathway that challenges students to complete a coherent set of CTE courses (three or more) and credentialing program in a high-value career pathway of their choice.

Second, revisit what it means to be "career ready." Ohio currently has a scattershot approach to demonstrating "career readiness." For instance, on the college-and-career-ready measure of the state report card, schools get credit when students meet just one of a smorgasbord of post-secondary readiness indicators. **Ohio needs a clear, career-ready definition that incorporates rigorous CTE coursework (and aligned assessments), high-quality credentials, *and* work-based learning, all in the same pathway.** An integrated readiness measure, which states like Arkansas and Maryland are moving toward, would promote quality and could be incorporated into graduation requirements and other accountability systems such as the report card.

Third, increase access to rigorous CTE. Historically disadvantaged students, particularly in Ohio's big cities, appear to have less access to high-priority programs. Rural and small-town students may also face diminished on-the-job opportunities, as fewer employers may be present in their communities. Policymakers should pursue strategies that expand access to quality CTE. This might include targeted grant programs to expand IWIP or work-based learning in urban or rural communities. It could also entail stronger promotion of inter- and intra-district open enrollment and dual enrollment. This would allow students to access CTE programs provided by a neighboring school or local community/technical college that is unavailable at their assigned district high school.

As the nation's seventh largest economy, Ohio continues to be a powerhouse that creates jobs and prosperity for its 12 million citizens. To ensure that the state maintains that lofty perch while advancing the prosperity of its residents in tomorrow's economy, policymakers must develop a skilled workforce. Creating a top-notch CTE system for primary and secondary students is one piece of a robust talent-development strategy. While progress has certainly been made, this report indicates there is still room for significant improvement. Gearing CTE more closely to high-wage, in-demand professions will be a heavy lift, one that should include school systems, higher education, and employers. But it's one worth undertaking, as Ohio's future—and that of hundreds of thousands of young people—depend on it.

Acknowledgments

Many individuals contributed their time and expertise to this project. First, I wish to thank Dr. Jay Plasman for digging into the data and authoring a fine report. Special thanks also to Eben Dowell and Kelsey Stephens of the Ohio Department of Education and Workforce who provided technical assistance and reviewed an early draft. On the Fordham team, Michael J. Petrilli, Chester E. Finn, Jr., and Chad L. Aldis offered thoughtful feedback during the drafting process, and Jeff Murray provided report production support. Lastly, I thank Kathi Kizirnis for copyediting the document, and Dave Williams for laying out the report.

- Aaron Churchill
Thomas B. Fordham Institute

Key terms

There are a number of technical terms and acronyms throughout this report that are worth describing and defining here. The first set of terms relate to measures of career and technical education (CTE) participation, while the second set includes terms relating to the types of schools where CTE is delivered to students.

CTE Participation

CTE participants is used to reflect a simple count of the number of students who completed at least one CTE course (Ohio defines completion of a course as being enrolled for at least 90 percent of the scheduled hours or earn at least partial credit) in a given year regardless of grade level in high school; this represents the most basic measure of CTE participation.

CTE concentrators reflects a more rigorous indicator of CTE participation (hereafter, simply "concentrators"). Prior to Perkins V, the federal government allowed states to create their own definition and Ohio used this: "a student who completed two courses and was enrolled in a third course within a single career pathway (OCTAE, 2018)." Now, under Perkins V, the federal government has a national definition of concentrators: "at the secondary school level, a student served by an eligible recipient who has completed at least two courses in a single approved Career Technical Education program or program of study (Ohio Department of Education and Workforce, 2025)." In this report, we examine CTE concentrators using a cohort approach based on year of entry into ninth grade as a means of identifying unique concentrators. Here, a concentrator is defined using the applicable definition for the identified year (i.e., beginning in the 2019–20 academic year, a concentrator is defined using the two-course definition; before 2019, a concentrator is defined using the two course, plus enrollment in a third definition).

Industry-recognized credentials (referred to simply as "credentials," or IRCs, for the remainder of the report) represent a verification of a student's skill and competence in an identified field to potential employers (Ohio Department of Education and Workforce, 2024). Ohio has approved hundreds of credentials, which students may earn to meet certain graduation requirements (see Box 2 on page 17). Similar to CTE participants, credential earning is taken as a snapshot of a single year. While credentials can be earned at many levels of education, here we focus on those earned in high school.

Work-based learning (WBL) is defined as "sustained interactions with industry or community professionals in real workplace settings, to the extent practicable, or simulated environments at an educational institution that fosters in-depth, firsthand engagement with the tasks required in a given career field, that are aligned to curriculum and instruction" (Ohio Department of Education, 2020). In Ohio, students who accumulate at least 250 hours of WBL over the course of high school meet career experience and technical skill competency guidelines (see Box 2 on page 17) under state graduation requirements. As with CTE concentrators, we identify WBL using a cohort approach based on the year a student entered ninth grade.

CTE Delivery

Traditional high schools are by far the most common type of secondary institution in Ohio. They are located within comprehensive school districts (i.e., an administrative entity) and provide comprehensive education programming, which may include CTE options. There were approximately 750 traditional high schools in Ohio in 2024.

Vocational high schools are standalone schools within a comprehensive school district that focus on the provision of CTE programming to students. Students in attendance at one of these schools are expected to participate in career preparation through CTE options. There were eight vocational schools in Ohio in 2024.

Joint Vocational School Districts (JVSDs) are direct career-focused education providers that operate as independent school districts and serve students from the surrounding school districts. They typically provide CTE programming in designated career tech centers. Students may attend career tech centers either full time or part time. As of 2024, there were forty-nine career tech centers in operation across Ohio.

Introduction

Workforce development is a major focal point for policymakers and practitioners around the country. In recent years, Ohio has taken center stage with respect to advancements in workforce development. With major investments from the private sector—including Google, Meta, Amazon, IBM, and the multi-billion-dollar Intel project—and the public sector through the CHIPS Act, Ohio is becoming a leader in workforce investment. The federal government recognized this by designating Columbus, Ohio as one of five Workforce Hubs across the country—an acknowledgement that Ohio is making moves in the right direction.

A key component in ensuring that the state is prepared to meet these expanding and ever-changing labor market needs is to provide high school students with opportunities to access and participate in career readiness activities and programming through career and technical education (CTE). In 2018, the federal government passed the Strengthening Career and Technical Education for the 21st Century Act, a reauthorization of the Perkins legislation that governs and funds CTE across the country. A major focal point of this authorization (the fifth iteration of the Perkins Act, aka Perkins V) was its emphasis on ensuring equitable access to CTE programming in high-demand, high-skill career fields for identified "special populations" including students from economically disadvantaged backgrounds, students with disabilities, English Learner students, homeless students, and students pursuing nontraditional fields.[4] Though students from traditionally underserved racial/ethnic backgrounds, such as Black or Hispanic students, are not officially included among these groups, they are important populations to consider given their focus in other federal legislation, such as the Every Student Succeeds Act (ESSA).

As well as increasing access to high-quality CTE opportunities, Perkins V also stipulates the need to create cross-sector partnerships spanning secondary schools, postsecondary institutions, and industry partners to ensure that labor market needs are met with respect to knowledge and skills gained during CTE experiences. Finally, Perkins V reemphasizes the alignment of CTE pathways with career fields with large current and projected needs.

CTE in Ohio

In addition to the federal initiative, Ohio has taken important steps to modernize CTE. Shortly after Perkins V came into effect during the 2019–20 academic year, Ohio created the Innovative Workforce Incentive Program (IWIP). The goal of this program is to improve career preparation for high school students in targeted

4 Collectively, Perkins V refers to these groups as "special populations." Under this legislation, students in nontraditional fields refers to students enrolled in a CTE program in which the opposite gender makes up more than 75 percent of the workforce in that field. In addition to these five identified groups, "special populations" also include single parents, out-of-workforce individuals, foster care students, and youth with a parent in the military.

labor market sectors identified as high-growth, high-need fields (e.g., information technology, advanced manufacturing, and skilled trades). Under this program, the state provides funds to schools through two distinct mechanisms. The first is an implementation grant to help schools develop IWIP credentialing programs at the secondary level. The second mechanism focuses on reimbursements to schools through incentive payments, under which schools are eligible to receive up to $1,250 for each credential earned by a student if the credential is recognized as a priority by the state. This amount is above and beyond the credential test fee reimbursements schools already receive for other credentials students earn, along with other funding streams used to support CTE. Through these grants to develop new programs and additional reimbursements for priority credentials, IWIP is one example of the state's commitment to and investment in workforce development.

With this policy background in mind, the purpose of this report is twofold. The primary goal is to provide a general overview of the current state of career-focused education in Ohio. A secondary goal, when available data make it possible, is to identify trends in career-focused education in Ohio. The period of interest for this report spans the academic years 2014–15 through 2022–23. Here, career-focused education is examined through multiple indicators: (1) CTE participants; (2) concentrators; (3) credential earners—non-IWIP and IWIP designated; and (4) WBL participants.

Along with these measures of CTE participation, we look at the data in several ways. First, we look at CTE as a broad umbrella (i.e., did a student complete coursework in any field of CTE in high school). Second, we look at CTE by career cluster, of which there were sixteen over the period covered by this report (U.S. Department of Education, n.d.). Third, we examine participation in unique career pathways, i.e., a sequence of aligned courses within one of the sixteen clusters. At the national level, there were seventy-nine recognized pathways in 2023 (Coalition for Workforce Development through CTE, 2024). Fourth, we look at career-focused education opportunities at different types of schools in the state, thereby allowing for an examination of exactly where these experiences take place. Fifth, the report analyzes data by student group, including several of the Perkins V "special populations."

Current Study

Ohio provides a valuable case study site to explore changes in CTE participation and delivery at the secondary level given the state's investment in career-focused education programming and the range of school types that deliver this programming. Prior work has explored changes in CTE participation over time, but most of these studies have focused on the national level and on changes related to the reauthorization of Perkins IV or prior (e.g., Dougherty & Macdonald, 2020; Gottfried et al., 2021; Kreisman & Stange, 2020; Plasman et al., 2020; Theobald et al., 2022). Additionally, these prior reports have typically focused on CTE participation only through the one-course definition or, occasionally, looking at concentration (taking multiple courses in a single field of study). With that in mind, most of these studies do point to increased participation among Perkins-defined special populations over time. However, a number of broad questions remain unanswered:

1. How has CTE participation and concentration changed over time and across different populations of students and fields of study?
2. How has credential earning changed over time to meet the needs of the labor market?
3. What are the characteristics of students in different types of schools that deliver CTE programming and what fields are they pursuing?
4. What does WBL participation look like in Ohio?

This report responds to these research questions through descriptive analyses of trends over time using data from the Ohio Department of Education and Workforce (Ohio DEW). The report is structured around the different measures of CTE participation and delivery as defined above and proceeds as follows. First, we explore changes in characteristics of CTE participants and concentrators. This section also discusses changes in participation by career cluster over the past ten years. The second section focuses on credentials. Here we look broadly at all credential earning as well as earning within IWIP-designated fields. We examine these trends broadly across all students and all credentials, as well as across student groups and unique credentials. Third, we present a description of CTE participation (as measured by CTE participants, concentrators, and credential earners) across types of schools in Ohio. Specifically, we identify whether there are observable differences between traditional high schools, vocational high schools, and career-tech centers. Finally, we examine a snapshot of WBL participation in the state.

The appendixes provide a more detailed discussion of the data used to respond to each of the above questions as well as supplemental findings that may be of interest to some readers but are not the main focus of the report. Additionally, there are three sidebars (pages 9, 17, and 27) throughout the report that provide clarification around topics that are important but adjacent to the main report and deserve more focus than a footnote. Throughout the report, we refer to the fiscal year. For example, any mention of the year 2016 refers to the 2015–16 academic year.

CTE participants and concentrators

Measuring the number of CTE participants and concentrators is the most common indicator of overall CTE participation. These numbers are reported at the federal level using very comparable definitions across states. As mentioned above, a majority of research exploring trends in CTE participation uses these measures. Additionally, much of the literature evaluating the impact of CTE participation on a wide variety of student outcomes focuses on one (or both) of these measures as predictors. For example, prior work has linked secondary CTE participation to improvements in high school graduation (e.g., Dougherty, 2018; Gottfried & Plasman, 2018; Kemple & Snipes, 2000), postsecondary enrollment (e.g., Dougherty, 2016; Plasman & Gottfried, 2018), and later success in the labor market (e.g., Brunner et al., 2023; Kemple & Willner, 2008; Plasman, 2019. As such, we begin our analyses with an exploration of changes in the number of CTE participants (i.e., course takers) and concentrators.

Research question: **How has CTE participation and concentration changed over time across different populations of students and fields of study?**

The first step in understanding the present state of CTE in Ohio is an exploratory look at how participation in CTE coursework has changed over time. To examine this question, I rely on data from Ohio DEW as provided through the Ohio Longitudinal Data Archive at The Ohio State University. For the purposes of these analyses, I focus on the academic years of 2014–15 through 2022–23.

The data include records for every student who was enrolled in an Ohio public high school during this time period. This dataset includes an indicator identifying a student as a CTE participant, which is defined as any student who took at least one CTE course.[5] Following the analysis of participants, we turn to trends in

5 There are slight differences for a CTE participant between Perkins IV and Perkins V. Under Perkins IV, a CTE participant is defined as a student who earned a credit in a CTE course. Under Perkins V, a participant is a student enrolled for at least 90 percent of a CTE course.

concentrators, which identifies students who complete at least two courses in a single career pathway. The findings below describe how the numbers of CTE participants and concentrators have changed during the study period and examine data by key populations, including "special populations" as defined in the federal Perkins Act. Analyzing these data by specific student groups allows us to gauge whether pupils of varying backgrounds participate in different CTE programs at different rates.

Box 1: Annual versus cohort numbers

Throughout the report, it is important to consider groupings of students in different ways depending on the measure of interest. Annual numbers (i.e., the total number of students who did something within a single academic year) are appropriate in instances where we highlight a measure that takes place solely within that year. These numbers include students from any of the four high school grades who were observed as meeting the indicator. For example, participating in single CTE course takes place within one academic year. As such, any student in any high school grade that participated in a CTE course that year would be included in this count. Indicators that are measured using this annual number approach:

- *CTE participation*
- *Credential receipt*

Looking at a full cohort is more appropriate for indicators that are more cumulative in nature. In instances where we use cohort numbers, we look only at students in the fourth year of high school who met the requirements for the given indicator. For example, CTE concentration typically involves participating in CTE over multiple years. As such, we consider concentration only for those students in their fourth year of high school who meet the concentration criteria. Indicators that are measured using this cohort number approach:

- *Concentration*
- *Work-based learning*

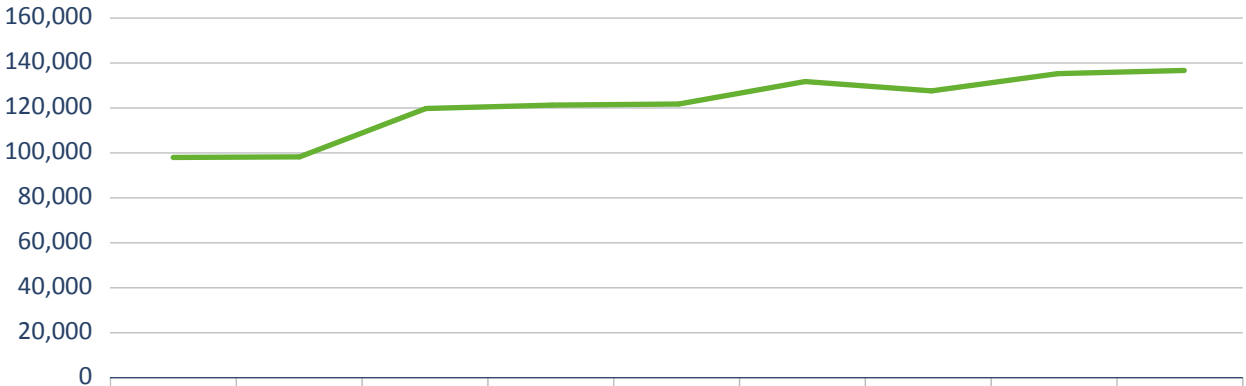
CTE participants

Finding 1: **The total number of CTE participants per year in Ohio has steadily increased over the past decade.**

Between academic years ending in 2015 and 2023, there was a nearly 30 percent increase in the total number of Ohio students (in grades 9 through 12) who participated in at least one course during the identified school year. Figure 1 below presents the overall trend during this period. Three years saw particularly sharp increases in overall participation rates. The largest increase was observed between 2016 and 2017, with an increase of more than 20 percent (approximately 21,000 students). There was another large jump in participation from 2019 to 2020, with more than 10,000 additional participants in 2020. The only observed decrease year over year occurred from 2020 to 2021, which likely reflects disruptions related to the COVID-19 pandemic. There is evidence this was indeed the case, as participation numbers bounced back in 2022 to above pre-pandemic levels. In 2023, almost 137,000 students participated in at least one course. To put that into perspective, there were approximately 573,000 high school students in Ohio in that year, indicating that about one in four (24 percent) of them participated in at least one course

that year.[6] Comparatively, in 2015, only 98,000 of the 610,000 high school students—just under one in six—participated in CTE (approximately 16 percent).

Figure 1. Total CTE participation over time



2015	2016	2017	2018	2019	2020	2021	2022	2023
97,989	98,252	119,772	121,276	121,754	131,761	127,603	135,279	136,692

Finding 2: **There are modest though evident changes in participation among certain student groups from 2015 to 2023.**

Figure 2 presents trends related to participation by students from different racial/ethnic backgrounds over the past decade. White students accounted for eight of every ten CTE participants in 2015. By 2023, this proportion was down slightly to about seven and a half. Though not a large change, Black students increased from just under 12 percent of participants in 2015 to nearly 13 percent in 2023. Hispanic students made up only 3 percent of CTE participants in 2015 but accounted for nearly 6 percent in 2023. The participation rates for these two groups indicate a slight underrepresentation when compared to the makeup of Ohio's entire school-aged population enrolled in public schools. Specifically, Black students made up 17 percent of the total student body and Hispanic students accounted for 7 percent of the student body in 2023.

6 Enrollment is calculated as the total number of students enrolled in from the October headcount data provided by the Ohio Department of Education and Workforce: https://education.ohio.gov/Topics/Data/Frequently-Requested-Data/Enrollment-Data

Figure 2. CTE participation by race/ethnicity

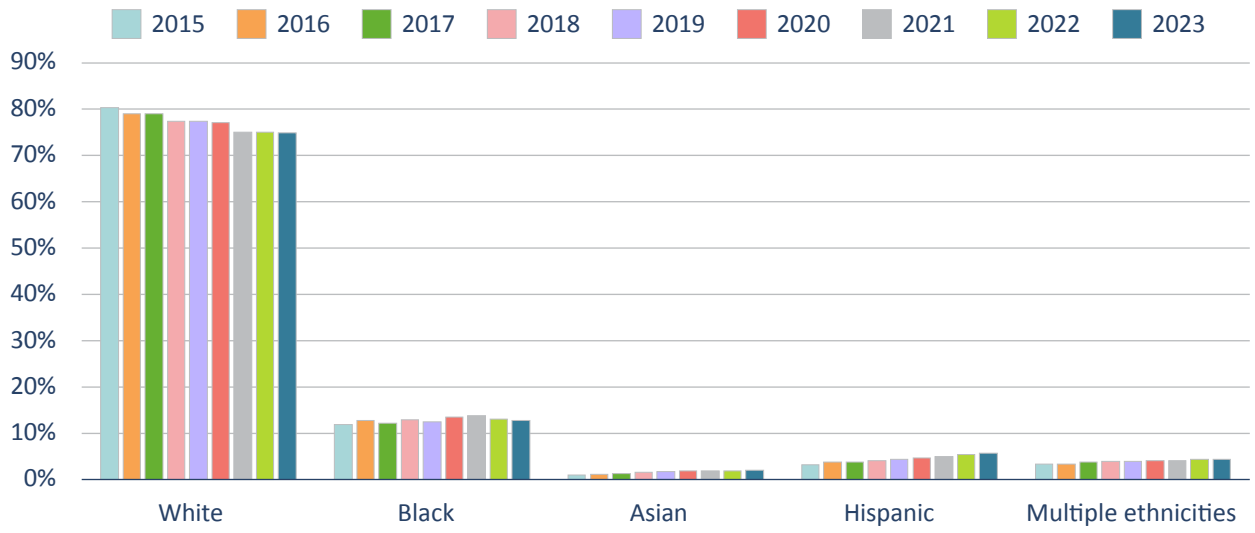
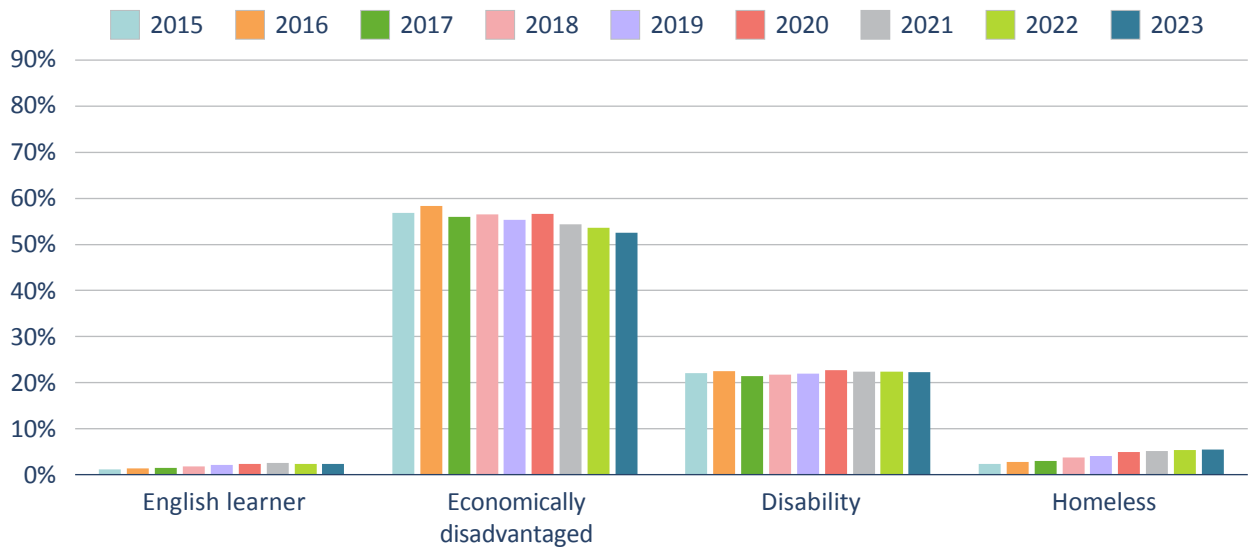


Figure 3 highlights four special populations identified in Perkins V: English Learner students, economically disadvantaged students, students with a disability, and homeless students.[7] The proportion of CTE participants with disabilities has remained relatively constant over time, however, at approximately 22 percent. Students with disabilities are slightly overrepresented as CTE participants, as 17 percent of total public school students statewide were identified as having a disability in the 2022–23 school year. The proportion of CTE participants from economically disadvantaged backgrounds decreased from a high of 58 percent in 2016 to just over 52 percent in 2023. Despite this decrease, the CTE participation rate for economically disadvantaged students remains slightly above the overall population of economically disadvantaged students in Ohio, which was 50 percent in the 2022–23 school year. For each identified population, it is important to recognize that while the proportion of participants may have decreased, the absolute number of participants increased overall, reflecting the broader CTE participation trends.

7 While homeless individuals were one of the groups added to the Perkins V "special populations" definition, they have been included as a unique group since at least 2015, allowing for a view of changes in participation.

Figure 3. CTE participation by Perkins-defined special populations



Concentrators

Finding 3: **Over time, there has been a sizable increase in the number of students identified as concentrators, from 28,000 in 2015 to more than 44,000 in 2023.**

For more than a decade under Perkins IV (2006–2019), states were given leeway to define concentrators using a definition that best fit the local context. Under this context, Ohio defined concentrators as students who completed at least two courses in a single career pathway and were also enrolled in a third. Under Perkins V, which went into effect in the 2019–20 school year, concentration received a national definition as a student who completed at least two courses in a single career pathway. Additionally, CTE courses taken in middle school can now be counted toward concentrator status provided the courses are taught at a high school level. Though a subtle change, the new definition removed the qualification for enrollment in a third course in Ohio, which impacts the numbers presented here.

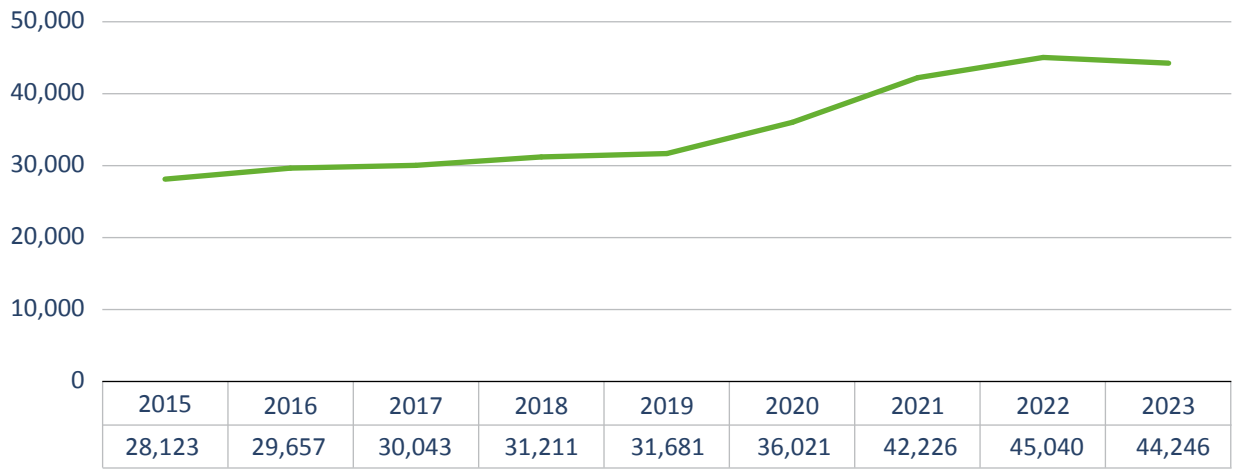
Under federal reporting guidelines, a student can be counted as a concentrator in multiple years—a student could be counted in the first year they earned concentrator status, potentially before freshman year, as well as subsequent years (again as a sophomore, junior, and senior). In this study, however, we identify only unique concentrators within a beginning ninth-grade cohort such that a student is only counted once as a concentrator.[8] For instance, Figure 4 shows that 28,123 students in the graduating class of 2015—students entering ninth grade in fall 2011—achieved concentrator status.

We observe a relatively steady level of concentration in total numbers from 2015 through 2019. However, following that period, there is a noticeable shift upward, peaking in 2022. Given an average cohort size of approximately 135,000 students, this equates to roughly one in three students in the most recent high school cohorts achieving concentrator status.[9]

8 See technical appendix for additional discussion of definitional and coding decisions.

9 Students are more likely to participate in CTE coursework as juniors or seniors in high school, which explains why the proportion of concentrators (one of three in a given cohort) appears to be larger than the proportion of CTE participants (one of four across the high school enrolled population).

Figure 4. Total CTE concentration



2015	2016	2017	2018	2019	2020	2021	2022	2023
28,123	29,657	30,043	31,211	31,681	36,021	42,226	45,040	44,246

Note: Data from 2015 through 2019 were based on Ohio's Perkins IV definition of a concentrator (completed two CTE courses in a career pathway, plus enrolled in a third), while data from 2020 through 2023 were based on a national definition of a concentrator under Perkins V (completed two CTE courses in a career pathway).

While the trend in concentration is clearly upward, three important points contextualize this finding. First, as noted above, Perkins V created for the first time, starting in 2019–20, a federal definition of a concentrator which uses a slightly more liberal threshold than Ohio had been doing. Second, Ohio altered its graduation requirements multiple times from 2015 to 2023, affording students more additional opportunities to meet state graduation requirements through CTE-based options. (Box 2 on page 17 provides additional description related to the current iteration of graduation requirements.) Third, as described in the previous section, there was a substantial increase in overall CTE participation from 2015 to 2023, which likely explains some of the overall concentration increase.

Finding 4: Concentration across racial and ethnic minorities and Perkins-defined 'special populations' aligns with increases in overall CTE participation.

Concentration by key student populations mirrors quite closely the findings for CTE participants. Table 1 shows the overall breakdown of concentrators from 2015–2023 with an emphasis on the graduating cohort from the identified year. Each of the racial/ethnic groups, including Black students, Asian students, and students identifying as multiple ethnicities, has maintained very consistent concentration rates over time, which are nearly identical to the proportions of CTE participants. Hispanic students do show steady growth in overall makeup of concentrators, which again mirrors CTE participant data. However, as with overall participation, the concentration rates for Black students and Hispanic students were slightly below the overall demographic makeup for those groups in 2022–23. Black students made up 12 percent of concentrators and 17 percent of the full public school population; Hispanic students made up 6 percent of concentrators and 7 percent of the full public school population.

Each of the special population groups shows consistent concentration rates. Unlike CTE participants, however, concentrators identified as economically disadvantaged did not exhibit a notable decrease in proportion over time. Students with disabilities consistently made up a slightly larger proportion of concentrators than CTE participants. The proportion of English Learner concentrators aligns nearly perfectly with English Learner CTE participants. The proportion of homeless concentrators also aligns with homeless CTE participants and shows a steady increasing trend over the past decade.

Table 1: CTE concentration by population

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Female	46%	46%	45%	45%	46%	45%	45%	45%	45%
Male	54%	54%	55%	55%	54%	55%	55%	55%	55%
White	81%	82%	82%	79%	79%	78%	76%	75%	76%
Black	12%	11%	11%	12%	12%	12%	13%	13%	12%
Asian	1%	1%	1%	1%	1%	1%	2%	2%	2%
Hispanic	3%	3%	3%	4%	4%	4%	5%	5%	6%
Multiple Ethnicities	3%	3%	3%	3%	4%	4%	4%	4%	4%
English Learner	1%	1%	1%	1%	2%	2%	2%	2%	2%
Economically Disadvantaged	54%	57%	58%	58%	58%	57%	57%	56%	56%
Disability	23%	24%	24%	24%	25%	24%	24%	23%	24%
Homeless	2%	2%	2%	3%	3%	4%	5%	5%	5%

Finding 5: **Two career clusters—Agriculture and Environmental Systems and Health Science—have consistently been the two most popular in Ohio over the past decade.**

Advance CTE (a national CTE advocacy group) maintains a framework that separates CTE broadly into sixteen career clusters that are recognized by the federal government (U.S. Department of Education, n.d.).[10] Though Ohio recognizes all sixteen clusters, the government and administration cluster had no offered pathways during the period covered by this report. Within each cluster, there are one or more career pathways that focus on the skills needed for specific industries (see Table B1, B2 and Figure B1 in Appendix B for detail). Looking at concentration across these career clusters, Table 2 presents the proportion of Ohio students identified as concentrators within each cluster (sorted on the 2022–23 school year).[11] By 2023, concentration in the top four most popular clusters (Agriculture and Environmental Systems; Health Science; Engineering and Science Tech; and Construction Tech) accounted for more than 50 percent of all concentrators that year.

10 This framework was updated in 2024 to reflect the cross-disciplinary nature of some of the clusters and develop a new cluster: https://careertech.org/wp-content/uploads/2024/06/Advancing_National_Career_Clusters-Framework_Draft_V3.2_June_2024.pdf. See Table 2 for identification of Ohio Career Clusters.

11 In this calculation, a student could be counted more than once if they concentrated in more than one field.

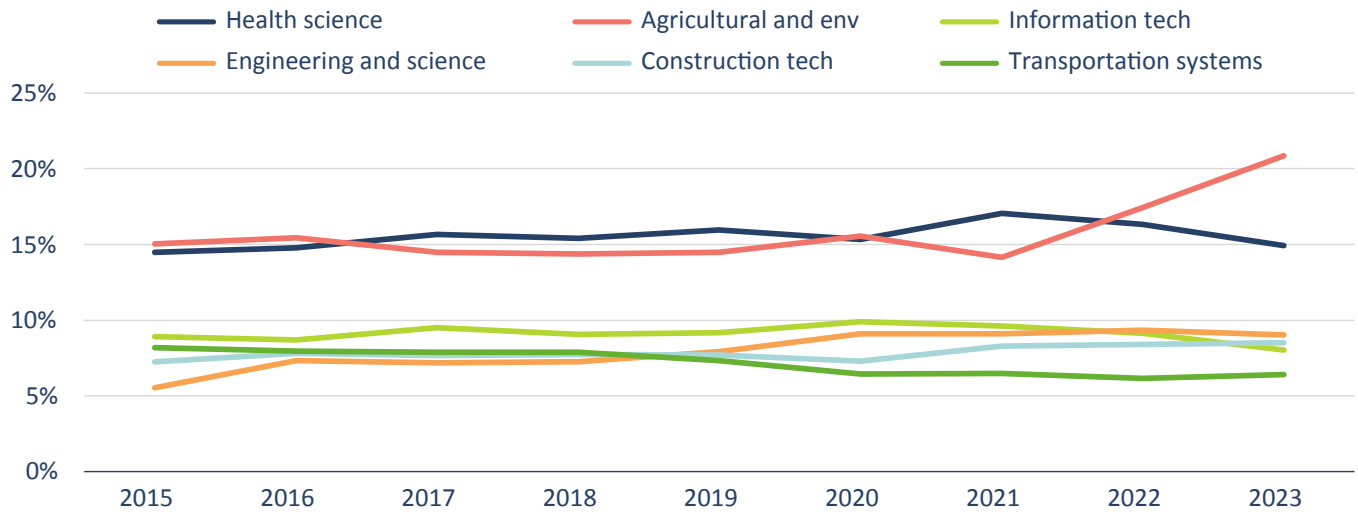
Table 2: CTE concentration by cluster

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Agriculture and Environ. Sys.	15.0%	15.4%	14.5%	14.4%	14.5%	15.5%	14.1%	17.4%	20.9%
Health Science	14.5%	14.8%	15.7%	15.4%	15.9%	15.3%	17.1%	16.3%	14.9%
Engineering and Science Tech.	5.5%	7.3%	7.2%	7.3%	7.9%	9.1%	9.1%	9.3%	9.0%
Construction Tech.	7.2%	7.8%	7.7%	7.7%	7.7%	7.3%	8.3%	8.4%	8.5%
Information Tech.	8.9%	8.7%	9.5%	9.1%	9.2%	9.9%	9.6%	9.1%	8.0%
Transportation Systems	8.2%	7.9%	7.9%	7.9%	7.3%	6.4%	6.5%	6.2%	6.4%
Manufacturing Tech.	5.2%	5.6%	6.0%	6.1%	5.9%	5.2%	5.4%	5.2%	5.7%
Business and Amin. Services	4.0%	2.9%	3.8%	4.0%	4.8%	6.5%	5.6%	6.0%	5.4%
Arts and Communication	5.0%	5.2%	5.0%	5.2%	5.1%	5.2%	5.3%	5.3%	5.0%
Human Services	6.9%	6.3%	6.5%	6.1%	5.8%	5.4%	5.0%	4.5%	4.7%
Hospitality and Tourism	4.5%	4.2%	4.2%	3.9%	3.8%	4.0%	3.9%	3.7%	3.6%
Law and Public Safety	3.8%	3.3%	3.5%	3.8%	3.4%	3.0%	3.4%	3.0%	2.9%
Education and Training	4.7%	4.6%	4.2%	4.3%	4.3%	3.5%	3.4%	2.9%	2.7%
Marketing	5.9%	5.2%	3.8%	4.2%	3.8%	3.0%	2.9%	2.2%	1.7%
Finance	0.7%	0.6%	0.7%	0.6%	0.5%	0.5%	0.3%	0.3%	0.3%

Note: Career clusters are identified by Ohio DEW (https://education.ohio.gov/Topics/Career-Tech/Career-Fields).

Figure 5 shows trends in concentration in the six clusters that made up at least 6 percent of all concentrators by 2023. Here we see a sharp increase since 2021 in the proportion of concentrators in the Agricultural and Environmental Systems cluster, overtaking Health Science as the most popular career cluster by a healthy margin.

Figure 5. CTE concentration over time, top clusters



Note: The two clusters of education and marketing saw decreased concentration from a 4.8 percent share to a 2.7 percent share, and a 6.2 percent share to a 1.7 percent share, respectively.

Industry-recognized credentials

While traditional measures of CTE participation have focused on completing a single CTE course (CTE participants) or completing a series of CTE courses (CTE concentrators), credentials have become extremely popular in recent years and warrant exploration. To date, there is very little research examining the efficacy of credentials. What little work exists shows relatively mixed results with respect to associated outcomes. There is some evidence from Texas that credentials relate to increased short-term earnings and odds of postsecondary enrollment, but the benefits appear to be limited only to a small handful of available credentials (Giani, 2022). Additionally, work out of Florida shows a link between earning a credential and graduating from high school (Glennie et al., 2024). Given these potential benefits, it is worth exploring questions related to who is earning credentials and which credentials they are earning.

Research question: **How has industry-recognized credential earning changed over time to meet the needs of the labor market?**

Ohio has changed the graduation requirements multiple times during the period of these analyses. Box 2 below provides details regarding the most current requirements. Of note, one of the options to earn a high school diploma revolves around earning credentials. Further, Ohio's IWIP initiative underscores the state's growing emphasis on linking career-focused education opportunities more directly to the needs of the local labor market. These statewide policy changes come under the backdrop of the federal Perkins legislation that identifies credential earning as one potential metric for tracking accountability, though Ohio does not use this indicator in its Perkins accountability reporting.[12]

With this policy backdrop in mind, it is helpful to determine how and whether there are observed differences in the number of students earning such credentials, the types of students earning them, and which credentials are earned. Of particular interest in Ohio, it is important to identify whether the IWIP initiative is linked to more students pursuing identified high-priority credentials.[13]

12 Though Ohio does not report on this measure at the federal level, credentials are included on state report cards. Both Perkins IV in 2006 and Perkins V in 2018 include industry-recognized credential earning as one potential accountability metric. Perkins refers to a broader "recognized postsecondary credential" indicator that includes other sub-baccalaureate credentials as well.

13 Note that the numbers reported by the Ohio Longitudinal Data Archive (OLDA—see Technical Appendix A) and those reported in the Ohio Department of Education and Workforce reimbursement report may differ since the year in which IWIP reimbursements were distributed does not always align with the year in which the credentials were earned. OLDA data only included credential information through the 2021–22 school year.

Box 2: Ohio's graduation requirements: Demonstrating competency and readiness with credentials

Beginning with the high school graduating class of 2023 (incoming freshman cohort of autumn 2019), Ohio implemented a set of requirements at the state level that students must meet to graduate from high school. These requirements fall across three key components: complete course curricular requirements; demonstrate competency; and demonstrate readiness (for a full description of each component, visit Ohio DEW's Long-term Graduation Requirements page).

Of particular relevance to this report are aspects of the competency and readiness components. One way to demonstrate competency, in lieu of meeting state-exam-based criteria, is through demonstrating key career experience and technical skills. Some options to satisfy this component include earning twelve points from credentials in a single career field or completing 250 hours of WBL (see Work-Based Learning section below). With respect to competency through credentials, each credential has been assigned a point value that reflects demand for related careers in the field and the role the credential may play in the hiring process. Some meet the twelve-point threshold on their own; others are worth as little as one point. Table 3 below provides examples of point values for the top ten most popular credentials at selected time points.

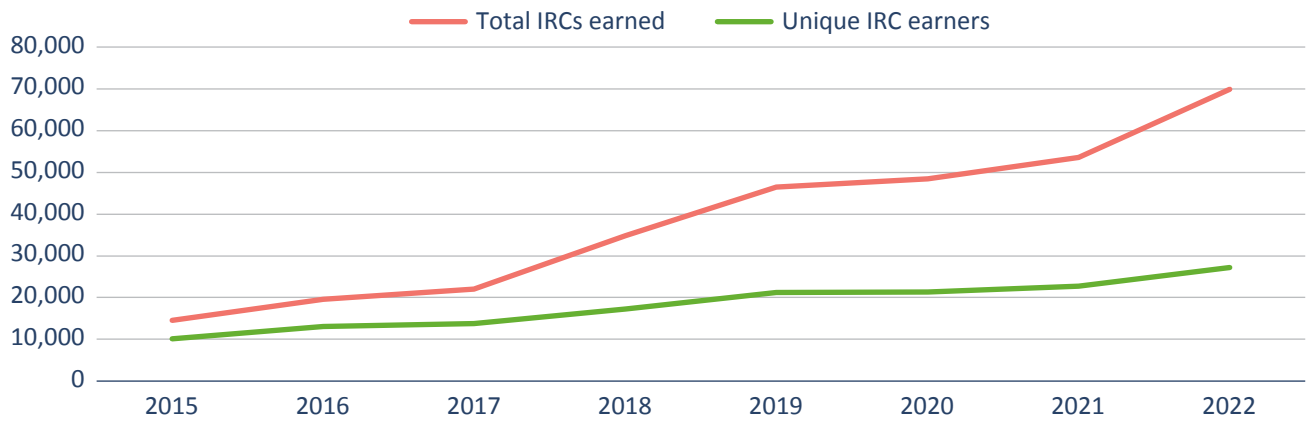
As for demonstrating readiness, the state has defined twelve graduation seals—of which students must earn at least two—that meet the standards for readiness. One of these seals is the Industry-Recognized Credential Seal. The requirements to earn this seal are nearly identical as those identified above to meet competency standards—to earn twelve points of credentials in a single career field. One noteworthy difference, however, is that to earn the seal, the Ohio Revised Code indicates that the credential(s) must be earned in a field deemed to be in demand in Ohio.

Finding 6: The number of unique credential earners and the total number of credentials earned both showed substantial growth from 2015 to 2022.

In addition to CTE participation and concentration, the Ohio DEW also tracks and reports the number of industry-recognized credentials earned and the field in which they were earned. Here, we identify both the number of individual students who earned at least one such credential (i.e., the number of students across any grade level from ninth to twelfth who earned a credential in a given year) as well as the total number of credentials earned.

Figure 6 below shows the overall increase in both these measures. From 2015 to 2022, the number of unique credential earners nearly tripled from approximately 10,000 to more than 27,000. To put that number into context, about 5 percent of Ohio's approximately 567,000 high school students earned at least one credential in 2022 compared to less than 2 percent of the 610,000 high school students in 2015—nearly triple the proportion of high school students earning a credential over the course of this eight-year period. However, it does not account for the fact that students can earn multiple credentials during high school. Thus, it is important to look also at the total number of credentials earned. Over this same period, the total number of credentials earned nearly quintupled from 14,500 in 2015 to almost 70,000 in 2022.

Figure 6. Industry-recognized credentials, unique earners and total earned



The outsized rate of growth for credentials earned (relative to unique IRC earners) resulted in a higher number of credentials earned per student. In 2015, the average credential earner was awarded approximately 1.44 credentials during high school. By 2022, the average credential earner was awarded approximately 2.57 credentials.

As with measures of concentration discussed previously, the changes in Ohio's graduation requirements along with expansion of credential offerings likely play a role in explaining these changes. Not only did the new requirements implemented in 2018 allow students to earn a credential to meet one of the graduation pathway options, but policymakers also defined a point system related to credentials. Specifically, to meet the credential graduation requirement, a student needs to earn credentials worth at least twelve points within a single career cluster. Some credentials alone provide this point total, while others may be worth fewer points. As such, students may need to earn multiple credentials to meet this twelve-point threshold, which likely drove the growth in the number of credentials earned as well as the credentials earned per student.[14]

Finding 7: **A number of student populations showed substantial increases in their proportion of total credential earners, including Black students, homeless students, and economically disadvantaged students.**

Consistent with CTE participation and concentration, the total number of credential earners across all student groups increased over the identified period. However, certain groups showed more substantial growth than others. Figure 7 highlights two groups that started out representing relatively small proportions of credential earners but showed significant increases in that share. The share of Black students earning credentials more than doubled during this time period, while the share of homeless students earning credentials more than quadrupled. Figure 8 highlights two additional groups that made up a substantial proportion of credential earners but exhibited opposite trends. Notably, the proportion of credential earners identified as economically disadvantaged students increased substantially. Female students, meanwhile, have made up a progressively smaller share of all credential earners over this time period.

14 The Ohio DEW maintains a database of all potential credentials with their associated point values and associated career clusters: https://education.ohio.gov/Topics/Ohio-s-Graduation-Requirements/Contacts-and-Resources/Industry-Recognized-Credentials/Industry-Recognized-Credentials-by-Career-Field. Table 3 presents the point values for selected credentials.

Figure 7. Changes in IRC by population, Black students and homeless students

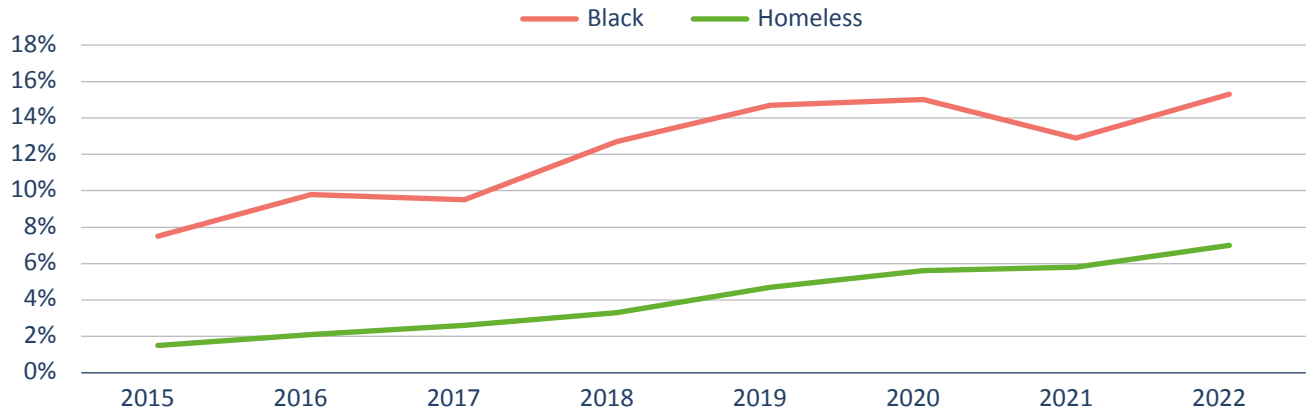
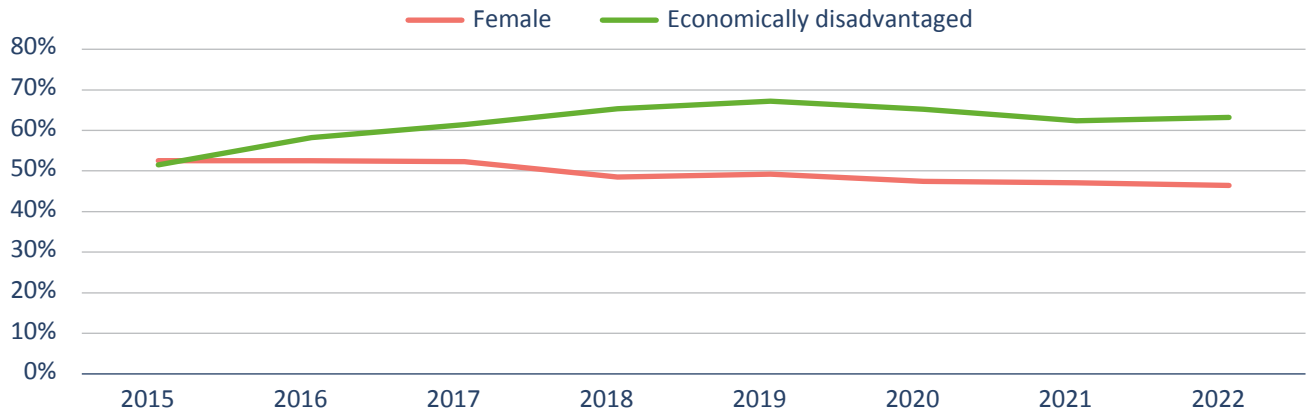


Figure 8. Changes in IRC by population, female and economically disadvantaged students



Finding 8: Since the introduction of IWIP incentive payments in the 2019 fiscal year, the proportion of high-priority credentials earned compared to total credentials earned has more than doubled.

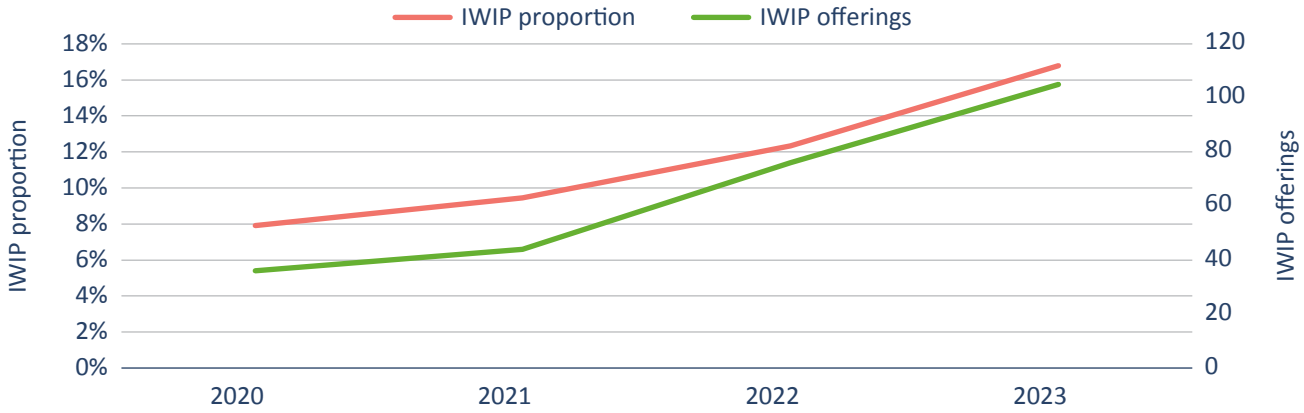
Using publicly available reimbursement records from Ohio DEW on IWIP payments, the first analysis here identifies changes in the proportion of IWIP credentials earned compared to total credentials earned.[15] As of 2024-2025, there were 208 unique IWIP credentials across eight different CTE career clusters.[16] With these records, it is possible to identify both the total number of payments distributed to schools for IWIP credentials earned as well as the number of payment reimbursements for each individual IWIP credential.

15 Excel files containing IWIP incentive payment information is available through the following link (note the FY indicator): https://education.ohio.gov/Topics/Finance-and-Funding/School-Payment-Reports/State-Funding-For-Schools/Traditional-School-Districts

16 Two clusters—Education and Training, and Transportation—had only one identified high-priority credential each. Construction Technologies included 48 credentials; Engineering and Science Technologies included 65; Health Science included 43; Information Technology included 47; Law and Public Safety included 8; and Manufacturing Technologies included 87 (some credentials were associated with multiple clusters). See https://education.ohio.gov/getattachment/Topics/Ohio-s-Graduation-Requirements/Contacts-and-Resources/Industry-Recognized-Credentials/Innovative-Workforce-Incentive-Program/2024-2025-Innovative-Workforce-Incentive-Program-Qualifying-Industry-Recognized-Credentials.pdf.aspx?lang=en-US for a full list of IWIP-identified credentials.

Figure 9 (left axis) presents the change in proportion of IWIP credentials compared to the total number of credentials earned (which include non-IWIP credentials that can be used for graduation), as illustrated by the darker line. In 2020, only 8 percent of credentials were IWIP (3,031 IWIP compared to 38,315 total credentials earned). By 2023, this proportion more than doubled to nearly 17 percent of credentials (19,175 IWIP compared to 114,211 total credentials). Meanwhile, the right axis provides a visual interpretation of the number of *different* IWIP credentials earned each year since the program's inception. As illustrated by the light-gray line, from 2020 to 2023, the total number of unique IWIP credentials-earned nearly tripled from 36 to 105. Both offerings and proportion of IWIP saw particularly sharp increases beginning in 2022, which may be explained by the introduction of the implementation grant (which was not run in the initial years of the program) as well as schools becoming more familiar with the program and having more opportunities to support credential pursuit coming out of COVID. These increases indicate the growing emphasis on ensuring students are participating in state-defined high-priority areas that are intended to be better aligned to workforce needs in Ohio.

Figure 9. IWIP credential changes over time



Though the total number of IWIP credentials earned and offered has increased substantially over the past few years, there remains room for improvement. Table 3 presents a snapshot of the ten most popular credentials at key timepoints.[17] There are a few elements worth highlighting here. First, IWIP-designated credentials made up fewer of the top ten credentials in 2022 than they did in 2015 (two in 2022 versus four in 2015). Additionally, they have moved lower on the list with respect to ranking; in fact, none of the top six most popular credentials in 2022 were IWIP-designated. Second, the top ten credentials in 2022 were worth fewer points on average than they were in 2015. In 2015, half of the most popular credentials were worth a full twelve points, while only one credential was worth twelve points in 2022. Some of this is likely explained by the overall increase in credential earning, but it raises questions as to how schools are prioritizing growth in credential offerings.

17 2015 represents the first year of available data; 2019 represents the year before IWIP took effect; and 2022 is the most recent year.

Table 3: Ten most popular IRCs at selected time points

2015	Points	Cluster
Ohio Department of Health - State Tested Nurse Assistant (STNA)	12	HEALTH
Ohio State Board of Cosmetology - License of Cosmetology	12	HUMAN
National Restaurant Association – ServSafe[a]	--	EDU/HOSPIT
NCCER Core and L1 Certification[b]	12	AG/CONST/ENG/MANU
Internet and Computing Core Certification (IC3)	2	IT
American Welding Society (AWS) - Certified Welder	12	MANU
National Institute for Automotive Service Excellence (ASE) - A5 Brakes	12	TRANSP
National Incident Management System 700	4	LAW
ProStart Certificate of Achievement	9	HOSPIT
National Incident Management System 100	4	LAW
2019	**Points**	**Cluster**
National Incident Management System 100	4	LAW
Ohio Department of Health - State Tested Nurse Assistant (STNA)	12	HEALTH
National Incident Management System 700	4	LAW
NCCER Core[b]	6	AG/CONST/ENG/MANU
National Restaurant Association – ServSafe[a]	--	EDU/HOSPIT
National Incident Management System 200	1	LAW
Ohio State Board of Cosmetology - License of Cosmetology	12	HUMAN
National Incident Management System 800	1	LAW
NCCER Level 1[b]	6	AG/CONST/ENG/MANU
American Welding Society (AWS) - Certified Welder	12	MANU
2022	**Points**	**Cluster**
RISE Up Retail Industry Fundamentals	6	BUSINESS/HOSPIT
National Incident Management System 100	4	LAW
National Incident Management System 700	4	LAW
RISE Up Customer Service and Sales	6	BUSINESS/HOSPIT
National Incident Management System 200	1	LAW
National Incident Management System 800	1	LAW
NCCER Core[b]	6	AG/CONST/ENG/MANU
Ohio Department of Health - State Tested Nurse Assistant (STNA)	12	HEALTH
Bleeding Control Basic 1.0 Course	1	CONST/LAW/HEALTH/
National Restaurant Association – ServSafe[a]	--	EDU/HOSPIT

Note: IWIP-designated high-priority credentials are the highlighted rows. IWIP did not exist in 2015, so highlighted credentials are those that would have been IWIP.

a – This credential has since been broken into multiple credentials (five total) with point totals ranging between 1 and 3.

b – NCCER Core and Level 1 were combined into a single credential in 2015 but separated by 2019.

CTE participation by school type

Clearly there has been expansion in CTE participation in Ohio as measured by the number of participants, concentrators, and credentials earned. However, given the variety of CTE providers across the state, it is worth examining how students in various types of schools may experience CTE.[18] Given the focal aspects of career-tech center and vocational schools on providing career-specific programming, any major differences in student characteristics or programs of study are worth noting.

Research questions: **What are the characteristics of students in different types of schools that deliver CTE programming and what fields are they pursuing?**

Ohio provides numerous opportunities for high school students to pursue CTE. Across the state, a vast majority of CTE programming occurs in two types of schools: traditional high schools and joint vocational school districts (JVSDs, which are also often referred to as career centers). More than 90 percent of CTE participants attend one of these two types of schools (see Appendix Table B3). Traditional high schools are situated within public school districts, while JVSDs are standalone career-focused schools and often serve students from multiple surrounding districts. Some school districts also offer CTE programming through dedicated vocational schools, though they serve far fewer students than either JVSDs or traditional high schools. However, these schools are worth discussing since they have similar aims as JVSDs—to provide students with dedicated, career-focused education programming.[19]

Finding 9: **There are evident differences in the characteristics of CTE participants at these different schools.**

There are three groups for which there are sizeable differences between traditional high schools, vocational schools, and JVSDs: Black students, economically disadvantaged students, and students with disabilities.[20] Table 4 presents these differences along with overall enrollment trends across these schools. Of note, traditional high schools served more CTE participants through 2016, but have since been overtaken by JVSDs, which now serve nearly 13,000 more CTE students across the state than traditional high schools. Another interesting trend in overall enrollment relates to vocational schools, which saw a large jump in student population in the 2019–20 school year (a more than 20 percent increase in enrollment).

18 See the Thomas B. Fordham Institute report on Ohio's Career-Technical Education Landscape for additional description of these options.

19 CTE programming is also delivered in charter schools (referred to as community schools in Ohio), correctional institutions, and through compact districts. See https://education.ohio.gov/getattachment/Topics/Career-Tech/Contacts-and-Resources/CTEDeliveryOhio.pdf.aspx?lang=en-US for more information.

20 It is worth noting that CTE participants in traditional high schools and CTE participants in JVSDs are being pulled from populations that are likely very different (see appendix Figure B2). While this likely explains much of the observed difference here, it is worth noting given the potential differences in resources for CTE at these two types of schools. As per the Ohio DEW, the statewide average base cost per CTE student in 2023 was $8,891, while it was $7,352 for non-CTE students. CTE students are funded at this higher amount regardless of school type, but a larger proportion of students at JVSDs are CTE students. See appendix Table B4 for additional funding differences.

Table 4: CTE participation by school type and key student characteristics

	2015	2016	2017	2018	2019	2020	2021	2022	2023
JVSDs									
Total	43,928	44,570	58,936	60,408	61,864	66,386	62,975	67,607	68,027
Percent Black	4%	5%	5%	6%	6%	6%	6%	6%	6%
Percent Econ. Dis.	52%	55%	53%	53%	53%	52%	50%	50%	49%
Percent Disab. Status	26%	27%	25%	25%	26%	25%	25%	25%	25%
Traditional High Schools									
Total	47,380	47,104	51,440	51,925	53,790	57,599	54,905	61,201	55,606
Percent Black	16%	18%	18%	19%	18%	19%	20%	18%	19%
Percent Econ. Dis.	57%	59%	58%	59%	57%	58%	57%	55%	56%
Percent Disab. Status	17%	17%	17%	17%	17%	18%	18%	18%	19%
Vocational Schools									
Total	2,596	3,075	3,130	2,981	3,057	3,740	3,925	3,775	3,949
Percent Black	41%	42%	44%	45%	43%	35%	32%	27%	25%
Percent Econ. Dis.	88%	88%	88%	88%	88%	77%	73%	68%	66%
Percent Disab. Status	27%	29%	28%	27%	27%	28%	27%	27%	28%

The student population makeup at each of these types of schools is also quite different. Traditional high schools are made up of a substantially larger proportion of Black students, while the JVSD population consists of a larger proportion of students with disabilities. Traditional high schools also serve a higher proportion of students from economically disadvantaged backgrounds, though the differences are less stark than across other characteristics. Vocational schools historically served an oversized proportion of either Black or economically disadvantaged students, but with the overall enrollment increase in enrollment beginning in 2020, these proportions have moved closer to reflecting the makeup of traditional high schools. However, vocational schools still serve relatively large proportions of historically underserved populations.

As mentioned above in footnote 20, these differences are likely due to the broader populations served by different types of schools. JVSDs are often situated outside urban centers, while traditional high schools with large numbers of CTE participants are more likely to be in urban areas.

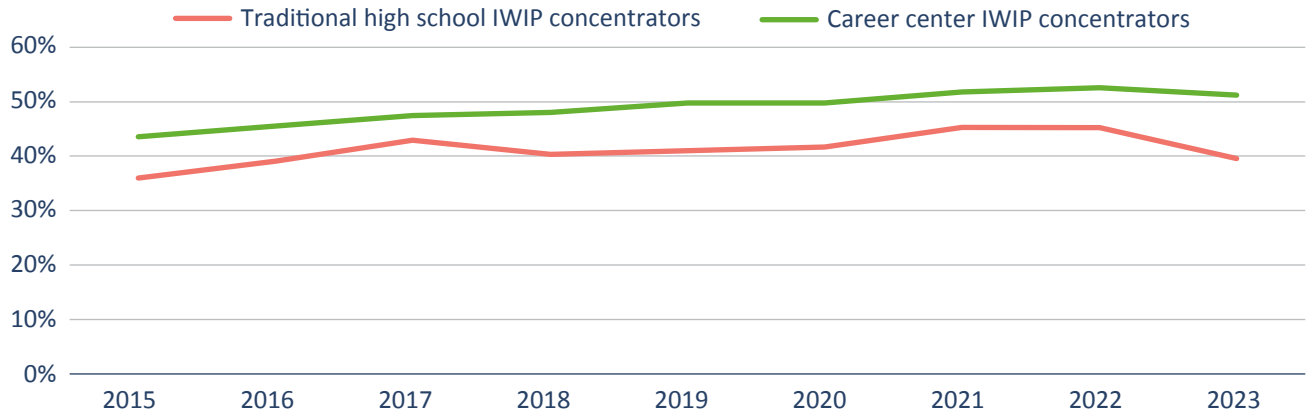
Finding 10: Career centers were more likely to provide CTE programming in the IWIP priority areas.

IWIP identifies high-priority career fields in which students may earn industry-recognized credentials. Specifically, there were six career clusters into which a vast majority of these IWIP credentials fall, which for the purposes of this study are defined as high-priority fields.[21] Here, the focus is on whether CTE students in career centers versus traditional high schools were more likely to concentrate—a coursetaking metric—and/or earn a credential in a high-priority IWIP field.

21 Construction Technology; Engineering and Science Technology; Health Science; Information Technology; Law and Public Safety; and Manufacturing

Figure 10 presents the results of these analyses for concentrators. Figure 11 presents the results for IWIP credential earners.[22] With respect to concentration (Figure 10), the JVSD career centers have shown a good deal of growth in the proportion of concentrators studying in an IWIP field. In 2023, just over half of concentrators at JVSDs did so in a high-priority career field. At traditional high schools, there was a slight upward trend in IWIP field concentration until 2023, which saw a substantial downturn. In 2023, roughly two in five concentrators at traditional high schools did so in a high-priority career field.

Figure 10. CTE concentrators in IWIP fields by school type



Turning to Figure 11 and credential earning, we see that a greater proportion of credential earners in traditional high schools earned what would have been deemed an IWIP credential in 2015. However, by 2022 (the most recent year with individual student credential data), the proportion of IWIP credentials in career centers greatly increased while the proportion in traditional high schools dipped slightly. These results suggest that students in JVSD career centers are more likely to have access to programming in IWIP high-priority areas.

The observable dip in IWIP credentialing at traditional high schools in 2020 and 2021 is almost certainly due to the COVID-19 pandemic. However, this dip is not evident in JVSDs. This is likely due to multiple factors. On one hand, all JVSD students participate in CTE programming, and as such the focus for these schools is by necessity on finding ways for students to complete CTE requirements. Traditional high schools, meanwhile, are likely to have many competing priorities for students, considering many do not pursue CTE programs of study. Further, JVSD career centers may be able to adapt more nimbly when it comes to introducing new programming options as they are likely to have more CTE-designated resources available. This is not a surprising finding given the differing foci of traditional high schools and career centers, but it is worth mentioning given the differences in student populations served at each type of school. One point that may be hidden in looking at proportions is that the lower percentage in traditional high schools is a combination of two factors. First, fewer students in traditional high schools earned IRCs in general compared to students in JVSDs. Additionally, a smaller number of these were identified as IWIP eligible. Ultimately, this suggests that less-advantaged students may have less access to CTE programming in high-priority career fields and may also be pushed into non-IWIP fields.

22 Though IWIP was introduced in 2019, it is possible to look back from that point to see whether students were previously participating in those fields.

Figure 11. IRC earners in IWIP fields by school type

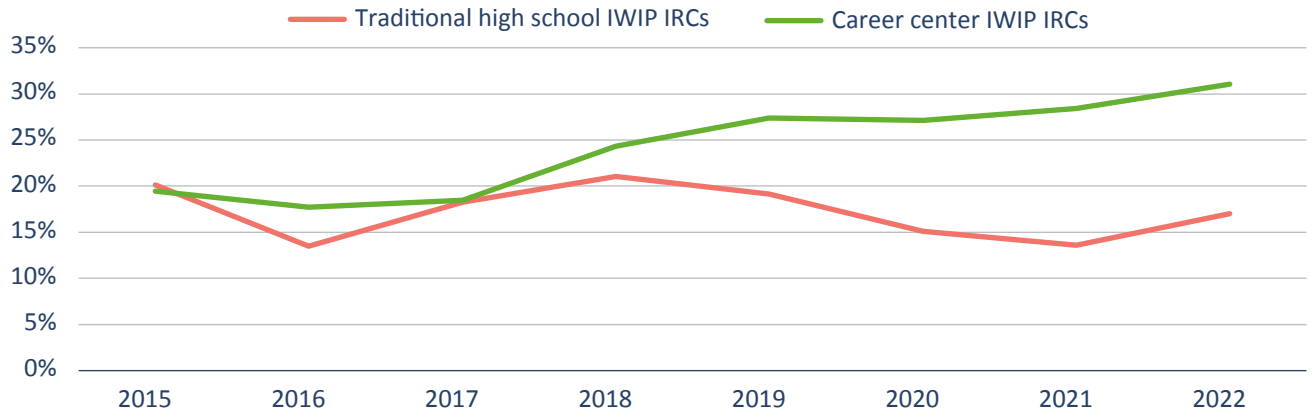


Table 5 presents a detailed breakdown of the proportion of populations that earned an IWIP credential as well as the proportion of all IWIP earners that group represented in 2022. To illustrate using Black students in JVSDs as an exemplar, Column 1 shows that the total enrollment of Black students in 2022 was 4,116 and 269 earned an IWIP credential. Column 2 shows this represents 7 percent of Black students earned an IWIP credential. Column 3 shows that of all IWIP earners (there were 5,266 in JVSDs), 5 percent were Black.

Comparing JVSDs and traditional schools, the most notable point is the difference in the total number of students earning IWIP credentials. This difference in total numbers is further backed by the proportion of the student body that earned an IWIP. At traditional high schools, less than 2 percent of all CTE participants earned an IWIP credential, while at JVSDs, 8 percent of all students earned an IWIP credential. Both these percentages are small, but the differences are noteworthy. An additional point worth mentioning is that only 1 percent of students with disabilities pursuing CTE in traditional high schools ultimately earned an IWIP credential, compared to 7 percent in JVSDs. However, economically disadvantaged students and Black students comprised a larger proportion of IWIP earners in traditional high schools than they did in JVSDs. Given differences in the goals of traditional high schools and JVSDs, IWIP earning in vocational schools is also shown here.

Table 5. IWIP credentials by student group

	(1) Student Count	(2) Percent Earning IWIP[a]	(3) Percent of IWIP Earners[b]
JVSDs			
Total Enrollment (Total IWIP)	67,607 (5,266)	8%	--
Black (IWIP earners)	4,116 (269)	7%	5%
Econ. Dis. (IWIP earners)	33,683 (2826)	8%	54%
Disab. Status (IWIP earners)	17,074 (1,112)	7%	21%
Traditional High Schools			
Total Enrollment (Total IWIP)	61,201 (1,073)	2%	--
Black (IWIP earners)	11,216 (253)	2%	24%
Econ. Dis. (IWIP earners)	33,257 (710)	2%	66%
Disab. Status (IWIP earners)	10,916 (158)	1%	15%

	(1) Student Count	(2) Percent Earning IWIP[a]	(3) Percent of IWIP Earners[b]
Vocational Schools			
Total Enrollment (Total IWIP)	3,775 (285)	8%	--
Black (IWIP earners)	1,021 (49)	5%	17%
Econ. Dis. (IWIP earners)	2,571 (135)	5%	47%
Disab. Status (IWIP earners)	1,004 (50)	5%	18%

a – calculated as the total number of students in the identified population earning an IWIP credential divided by the total number of students in that population

b – calculated as the number of students in the identified population divided by total IWIP earners

Work-based learning

One of the goals of CTE, whether delivered at a traditional high school, a vocational school, or in a career-tech center, is to prepare students to succeed in the workforce. An important aspect of this success is having the opportunity to experience a true workplace setting. Work-based learning (WBL) is designed to provide this opportunity. As such, WBL is another important measure of career-focused education that is not equivalent to coursework or earning credentials, but it is certainly related. As with these other measures of CTE participation, there is evidence that WBL is related to benefits such as high school completion (e.g., Hemelt et al., 2019, Sun & Spinney, 2017), postsecondary enrollment (e.g., Buzzeo & Cifci, 2017), and later labor market earnings (e.g., Plasman & Thompson, 2023).

Research question: What does WBL participation look like in Ohio?

When the Perkins legislation was reauthorized in 2018, the federal government indicated an emphasis on including WBL opportunities as a core component of high-quality career pathway programs. Prior to this time, though WBL was taking place in Ohio, these opportunities were not reported in a standardized manner, and it is only since 2022 that WBL reporting has become fully institutionalized. As such, any information on WBL participation prior to the 2021–22 school year contributes little to the understanding of trends in this area.

With this in mind, all analyses associated with WBL focus on the two cohorts of students from 2022 and 2023. Like concentrator status, we look at WBL participation over the full high school experience. As such, the 2022 analyses identify WBL participation for the incoming ninth grade cohort of 2018–19 while the 2023 analyses highlight students from the 2019–20 ninth grade cohort. To add further clarity to the overall discussion of WBL, one must understand that, beginning with the graduating class of 2023, WBL participation became an option under the career experience and technical skill competency portion of the state graduation requirement. To meet this measure, a student would need to complete an experience providing at least 250 hours of programming cumulatively throughout high school.

Box 3: Ohio's graduation requirements: Demonstrating competency with WBL

As mentioned above in relation to credentials, one of the key components for meeting alternative, CTE-oriented high school graduation requirements is demonstrating competency through career experience and technical skills. Completing 250 hours of WBL is one of the options for meeting this competency requirement. At the federal level, WBL is defined as "sustained interactions with industry or community professionals in real workplace settings, to the extent practicable, or simulated environments at an educational institution that fosters in-depth, firsthand engagement with the tasks required in a given career field, that are aligned to curriculum and instruction." Ohio applies this definition in identifying the variety of opportunities for students, including job site placements/internships; apprenticeship or pre-apprenticeship programs; remote or virtual placements; entrepreneurship; school-based enterprise; and simulated work environments. Students can accumulate the 250 hours across any range of WBL experiences. Regardless of a student's chosen WBL experiences, however, there are three guiding principles that must be met to ensure the experience qualifies:

1. WBL must take place at a work site, whether in the school, virtual, or at another location. However, it cannot take place during regular instructional time.
2. All WBL experiences need to be supervised by both an educational representative (e.g., teacher, counselor, etc.) and a business representative.
3. Each experience needs to incorporate a learning agreement that aligns professional, academic, and technical competencies to the student's program of study, student success plan, or graduation plan.

This section explores the current state of WBL in Ohio.[23] Unlike CTE participants and concentrators or credential earners, we are unable to explore changes over time. As such, this section should be viewed as a current snapshot of WBL in Ohio.

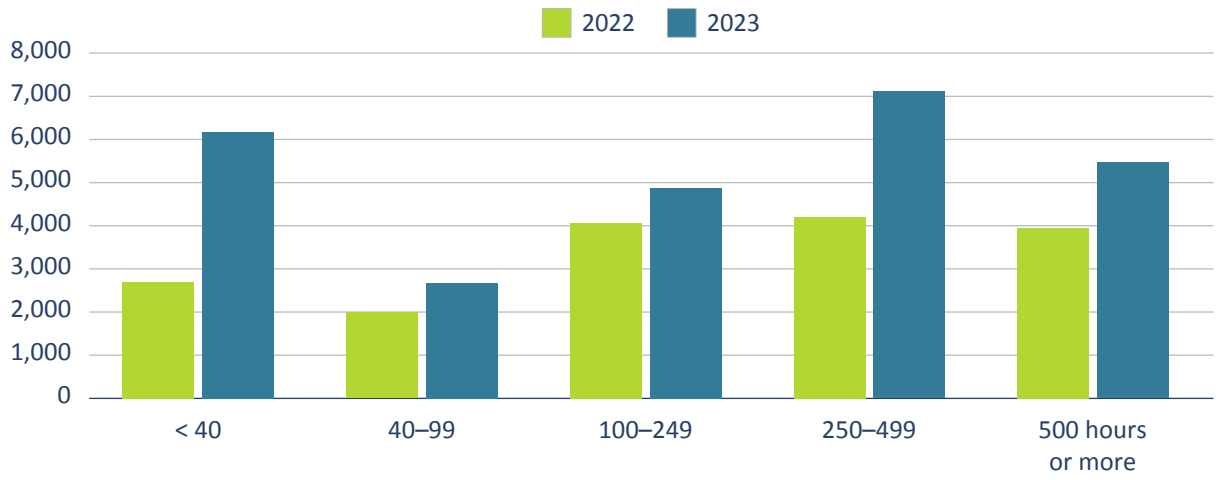
Finding 11: More than 26,000 students from the 2019 freshman cohort earned hours for participating in WBL.

Among students from the 2023 cohort, more than 26,000 students (about 19 percent of the cohort) earned some number of WBL hours. Of this group, approximately 21,040 were also identified as concentrators, which represents just under half of all concentrators (44,246 in 2023). This is up from about 17,000 students (just over 12 percent of the cohort) from the 2022 cohort (14,500 were also concentrators, representing less than one-third of the 45,040 total concentrators that year). See appendix Table B5 for a breakdown of WBL participation by student groups.

Turning to participation in WBL by cumulative hours earned, Figure 12 shows the breakdown across these different options. The cumulative hours earned for each student was reported by each school in the final reporting period. Of the 26,279 students who earned WBL hours from the 2023 graduating cohort, less than half (12,567) achieved the 250-hour threshold, though this is still approximately 50 percent higher than the number of students meeting this threshold in 2022. A final point focuses on the prevalence of students finishing high school with fewer than forty hours of WBL. In the 2023 cohort, more than 6,000 students earned fewer than forty hours of cumulative WBL—more than double the number of students who finished high school at this level in 2022.

23 There are multiple indicators related to work-based learning experiences as identified through participation in a career-technical program, including: internship completion, apprenticeship acceptance, apprenticeship completion, work experience and career exploration, Jobs for Ohio's Graduates (JOG), Tech Prep, and hours of WBL completed. For the purposes of this report, we focus on the total hours completed during high school.

Figure 12. WBL participation by hours earned, classes of 2022 and 2023



Conclusion

In the spring of 2023, Ohio Governor Mike DeWine pledged to invest approximately $300 million in additional funds to ensure CTE in the state is meeting the high demands of industry (Poiner, 2024). This amount comes on top of the more than $52 million in federal funds through Perkins V as well as $16 million in reimbursements for credentials ($10.5 million through IWIP and $5.5 million for non-IWIP credentials) and the existing CTE operating budget (Perkins Collaborative Resource Network, 2023). These massive investments highlight the seriousness with which Ohio is working to become a true workforce development hub for the twenty-first century. However, given the size of these investments, this report brings up important considerations that should be addressed as policymakers and taxpayers look for accountability, an assurance of a strong return on investment, and provision of high-quality career-focused education for Ohio's youth.

First, through this report, we have made clear that there are many ways to measure CTE participation and define what it means to be a CTE student. The federal accountability guidelines require that states report the number of CTE participants (students who complete at least one course in a CTE program of study) and concentrators (students who complete at least two courses in a single CTE program of study). These definitions ensure standardized reporting at the federal level but are much less meaningful for the state of Ohio. With the introduction of a federal concentrator definition under Perkins V, many of the state-level performance indicators with respect to CTE drastically changed. Importantly, this new concentrator definition likely does not identify the same level of investment by a student in a specific CTE career pathway as under the prior definition (i.e., the prior definition included the stipulation that a student be enrolled in a third course). As such, some concentrators (those identified under the new Perkins V definition) may not have the desire to participate in WBL or excel in technical assessments (key career-focused indicators within the state of Ohio) if they are not truly interested in pursuing a CTE career pathway.[24] In this report, we provide evidence of this potential disconnect between concentration and a student's interest in pursuing CTE given the prevalence of students who do not meet the 250-hour WBL requirement.

24 https://education.ohio.gov/getattachment/Topics/Career-Tech/CTE-Data-and-Accountability/Data-and-Accountability-Guidebook-2024.pdf.aspx?lang=en-US.

Second, the push to increase access to credentials and to align credentials to high-quality, high-demand fields is certainly a commendable objective. In this report, we present solid evidence that these efforts are having an impact, as evidenced by the increase in the numbers of credentials students earned in recent years. The IWIP initiative is a great step forward in working to better align the needs of the state with credentialing opportunities available to students. However, these opportunities do not appear to be equally available to or pursued by students, depending on where they receive their CTE programming. Students from urban areas who are more likely to be Black or Hispanic and low-income—appear to have less access to IWIP programs at their local high school. Future iterations of IWIP should consider additional data from local and regional labor market projections to identify areas of focus. Relatedly, little is known about the efficacy of these credentials and whether the investment in credentials through various reimbursement mechanisms is seeing a strong return on investment. Outside Ohio, numerous states, including Texas and Florida, have examined the prevalence of credentials and what the potential effects of earning these credentials may be (Giani, 2022; Glenn et al., 2020; Glennie et al., 2024). The evidence has been mixed, and to date there is no definitive evidence of links between credentials earned in high school and later labor market effects.

Third, it is clear that traditional high schools and JVSD career centers serve students from districts that have very different demographic makeups. However, the flexibility of career centers to update and upgrade programs and program offerings raises issues about access to high-quality CTE for some student groups. We see this particularly with respect to the growth in concentration and credential earning in high-priority areas as identified by IWIP. Specifically, career centers have seen substantially more growth in the numbers of concentrators in IWIP fields and IWIP credential earners than traditional schools. Given the differences in populations served (traditional schools are more likely to serve Black students, economically disadvantaged students, and homeless students), it will become increasingly important for policymakers to ensure equitable access to these opportunities for all students. The evidence presented in this report—that CTE students in traditional high schools are less likely to concentrate in a target field and less likely to earn an IWIP credential—suggests that something may need to change. In the 2023–24 school year, a NAF academy (a career-focused academy, often within an existing high school) was approved in the Columbus City School District.[25] Such academies are aimed at providing high-quality career pathways in high-demand fields through strong partnerships between secondary, postsecondary, and business institutions in conjunction with rigorous curricula integrated with career learning opportunities. Traditional high schools may look to embrace similar strategies to provide students with additional opportunities to pursue career-focused education.

Ultimately, there is good reason for optimism about Ohio's commitment to workforce development through CTE opportunities in high school. Given the speed of advancements in technology and the labor market in general, it is imperative this level of commitment to and enthusiasm for CTE at the state level remains high. While the federal government requires reporting of concentrators using the federal definition, Ohio policymakers need to consider whether this definition of concentration is meaningful for the state. In practice, a more comprehensive approach to reporting in this area would focus on students completing a CTE pathway. A measure that includes an indicator of completing a rigorous CTE course sequence in conjunction with completing 250 hours of WBL and earning high-quality credentials could provide a more meaningful look at the true benefits of participating in a comprehensive CTE program of study and preparation for rewarding postsecondary and employment. In order to stay competitive and ensure students are receiving the best educational opportunities, Ohio needs to continue working to build strong career pathways for students—and track exactly how many students complete them.

25 https://naf.org/our-academies/find-an-academy/.

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Appendix A: Technical Notes

Data for this report were provided through multiple datasets through the Ohio Longitudinal Data Archive (OLDA). Information was provided directly to OLDA by Ohio DEW as well as through the Education Management Information System (EMIS). To allow for merging across datasets, OLDA created a common identifier (called emis_student_pseudo_id) for each student, which serves as the linking element. OLDA also provided a visual map identifying common links across the EMIS-provided datasets.

Key Measures

CTE Participants. CTE participants are identified directly in an Ohio DEW CTE participant file. To ensure accuracy, duplicate records by student ID and academic year were removed, resulting in one record per student per year. Given the associations between vocational schools and JVSD career centers with students' home schools, there were many instances in which a student was identified in the dataset as enrolled at multiple schools. The reporting school was given credit for CTE participation. This results in a measure of total CTE participants in any grade in a given year.

CTE Concentrators. Like CTE participants, CTE concentrators are identified in an Ohio DEW file on CTE concentrators. In federal reporting, once a student is identified as a CTE concentrator, that student is reported in the first year of attaining CTE concentration status as well as subsequent years in which they are taking courses aligned with their pathway. In this report, we identify unique CTE concentrators. In other words, we only count CTE concentrators in one year based on membership in an identified ninth-grade cohort (provided in EMIS student detail file). As such, we removed duplicate records by student ID. In addition to year of concentration, this dataset also includes the pathway in which a student achieved concentration status. Using the program of concentration codes, we were able to also identify the cluster in which each pathway fell. In calculating CTE concentrators in clusters or pathways, we did allow a student to be counted more than once if they were identified as concentrators in multiple fields.

Industry-Recognized Credentials. Ohio DEW provided a credentials-earned file that identified the industry-recognized credentials earned by each student. We dropped duplicate records based on credential and year for each student. We then created a measure of the total number of students who earned at least one credential in each year as well as a measure that identified the total number of credentials earned by each student by year. Finally, we used credential codes to identify the number of students who earned each type of credential each year. IWIP credentials were identified using Ohio DEW's list of qualifying credentials.

Work-Based Learning. In Ohio, work-based learning requirements can be met through multiple experiences, including job site placement and internship; apprenticeship and pre-apprenticeship; remote or virtual placement; entrepreneurship; school-based enterprise; and simulated work environment. The file provided by Ohio DEW that contains information on WBL does not differentiate across all these varied types of opportunities. The main file includes information on all programs in which students participated in high school, one of which is identified as "Career-Technical Program." Under this category are eleven unique programs, one of which is entitled "Work-based learning program codes by hours of completion." The categories are those identified in the main body of the report. As with CTE concentrators, we count the number of unique WBL participants by membership in a ninth-grade cohort. In the instance of WBL, however, we only have two full cohorts, due to changes in reporting standards. WBL hours accumulate over the course of high school, with the final record for a student identifying the cumulative number of hours. We rely on this final record to identify the total number of hours of WBL for a student during high school.

School Type. In each file provided by Ohio DEW, schools and districts are assigned an Information Retrieval Number (IRN). Across the different files, the IRN is used in different ways. We created a new IRN indicator to identify the school at which a student participated in various CTE opportunities. We linked this identifier to a file provided by Ohio DEW identifying vocational schools. We also linked these identifiers to a file from Ohio DEW identifying current organization status that included designations for public schools, community schools, JVSDs, public districts, and STEM schools. Finally, we used publicly available data on CTPDs from Ohio DEW to provide further detail on the type of CTPD (JVSD, comprehensive, compact/contract). With this final dataset identifying the type of school, we defined the eight types of schools as identified in the main report. We then linked this school dataset to the student records to create a complete record for each student.

Demographic Variables

Demographic variables and other student identifiers came from a variety of files from EMIS. Information related to race/ethnicity and gender were contained in the general student file. Disability status, English Learner, and economic disadvantage indicators are all included in the student detail file. A student was identified as having a disability if there was any record of a disability at any point. This was based on an identified disability condition or ever receiving services from a 504 plan. We also identified English Learner in a similar manner (ever receiving services). Similarly, economic disadvantage was also defined as ever having a record. We chose to use this definition of "ever observed" for each of these indicators given inconsistencies in data such that students were sometimes identified, within the same year but at different schools, as both "yes" and "no." This may be due to different reporting standards or requirements, but it creates some level of ambiguity as to how students should be counted. We therefore take the more liberal approach of counting someone in a given category if they were ever observed as such. The final indicator, homeless status, was identified using the student homeless detail file from EMIS. We identified homeless status as any indication other than "not applicable" to align with McKinney-Vento definitions.

Appendix B: Supplemental Tables

Career clusters and pathways

In Ohio, there were as many as 92 pathways in which students were identified as concentrators in 2015. As of 2023, there were 46 pathways (see Figure B1). These career pathways were identified by whether a student was ever deemed a CTE concentrator in that field. Table B1 identifies the career pathways/career cluster framework in 2023 and the total number of concentrators within each.[26]

26 These only include those pathways in which at least ten students concentrated. An additional five pathways had fewer than five students.

Figure B1. Career pathway offerings over time

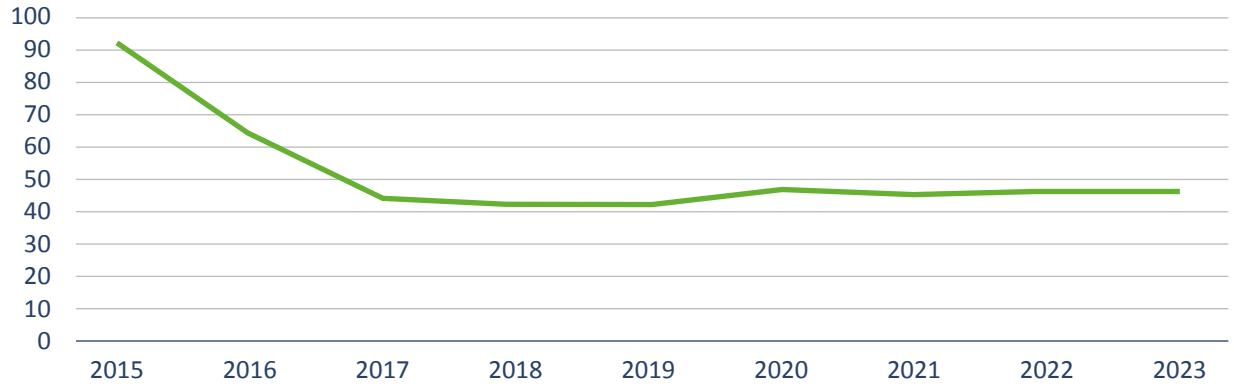


Table B1: Concentration by Pathway and Cluster

Pathway by Cluster	Student Count
Agricultural and Environmental Systems	**18,910**
Agribusiness and Production Systems	13,865
Animal Science and Management	2,197
Agricultural and Industrial Power Technologies	887
Horticulture	833
Biotechnology for Food, Plant and Animal	624
Natural Resource Management	504
Health Science	**13,550**
Allied Health and Nursing	7,688
Biotechnology	3,135
Exercise Science/Sports and Recreation Health	2,574
Health Information Management Services	121
Therapeutic Services	32
Engineering and Science Technologies	**8,181**
Engineering and Design	8,125
Robotics	56
Construction Technologies	**7,718**
Structural Systems	4,489
Mechanical, Electrical and Plumbing Systems	2,738
Construction, Design and Management	491
Information Technology	**7,278**
Interactive Media	2,555
Programming and Software Development	1,615
Network Systems	1,362
Cybersecurity	879
Information Support and Services	867

Pathway by Cluster	Student Count
Transportation Systems	**5,812**
Ground Transportations	5,355
Air Transportation	446
Maritime Occupations	11
Manufacturing Technologies	**5,189**
Manufacturing Operations	4,933
Metallurgy	256
Business and Administrative Services	**4,941**
Business and Administrative Services	4,928
Logistics and Supply Chain Management	13
Arts and Communication	**4,513**
Visual Design and Imaging	2,116
Media Arts	1,360
Performing Arts	1,037
Human Services	**3,622**
Cosmetology	3,622
Hospitality and Tourism	**3,297**
Culinary and Food Service Operations	3,011
Lodging	286
Law and Public Safety	**2,657**
Criminal Justice	1,935
Firefighting and Emergency Medical Services	722
Education and Training	**2,490**
Early Childhood Education	1,532
Teaching Professions	958
Marketing	**1,561**
Marketing	1,561
Finance	**313**
Finance	313

Since 2016, either the Allied Health and Nursing pathway or the Agriculture and Production Systems pathway has had the highest number of CTE concentrators (see Table B2). Engineering and Design, Ground Transportation, Manufacturing Operations, and Business and Administrative Services have also each appeared in the top five since 2016.

Table B2. Most popular career pathways by year

2015	2016	2017
1. Agriculture and Production Sys.	1. Allied Health and Nursing	1. Allied Health and Nursing
2. Cosmetology	2. Ag and Prod Sys	2. Ag and Prod Sys
3. Therapeutic Pathway	3. Ground Transp.	3. Ground Transp.
4. Auto Technology	4. Engineering and Design	4. Engineering and Design
5. Culinary Arts	5. Manufacturing Operations	5. Manu. Ops.
6. Marketing	6. Cosmetology	6. Cosmetology
7. Interactive Media	7. Structural Systems	7. Structural Sys
8. Early Childhood Education	8. Culinary Arts	8. Culinary Arts
9. Visual Design and Imaging	9. Interactive Media	9. Marketing
10. Engineering and Design	10. Marketing	10. Interactive Med

2018	2019	2020
1. Allied Health and Nursing	1. Allied Health and Nursing	1. Ag and Prod Sys
2. Ag and Prod Sys	2. Ag and Prod Sys	2. Allied Health and Nursing
3. Ground Transp.	3. Engineering and Design	3. Engineering and Design
4. Engineering and Design	4. Ground Transp.	4. Bus. and Admin Serv
5. Manu. Ops	5. Manu. Ops	5. Ground Transp.
6. Cosmetology	6. Cosmetology	6. Manu. Ops
7. Structural Sys.	7. Bus. and Admin Serv	7. Structural Sys.
8. Marketing	8. Structural Sys.	8. Cosmetology
9. Bus. and Admin Serv	9. Marketing	9. Interactive Med.
10. Interactive Med	10. Interactive Med	10. Medical Bioscience

2021	2022	2023
1. Allied Health and Nursing	1. Ag and Prod Sys	1. Ag and Prod Sys
2. Engineering and Design	2. Engineering and Design	2. Engineering and Design
3. Ag and Prod Sys	3. Allied Health and Nursing	3. Allied Health and Nursing
4. Ground Transp.	4. Bus. and Admin Serv	4. Ground Transp.
5. Bus. and Admin Serv	5. Ground Transp.	5. Manu. Ops
6. Manu. Ops	6. Manu. Ops	6. Bus. and Admin Serv
7. Structural Sys.	7. Structural Sys.	7. Structural Sys.
8. Biotechnology	8. Biotechnology	8. Cosmetology
9. Cosmetology	9. Cosmetology	9. Biotechnology
10. Interactive Med	10. Cul. And Food Service Ops	10. Cul. And Food Service Ops

CTE participation by school type

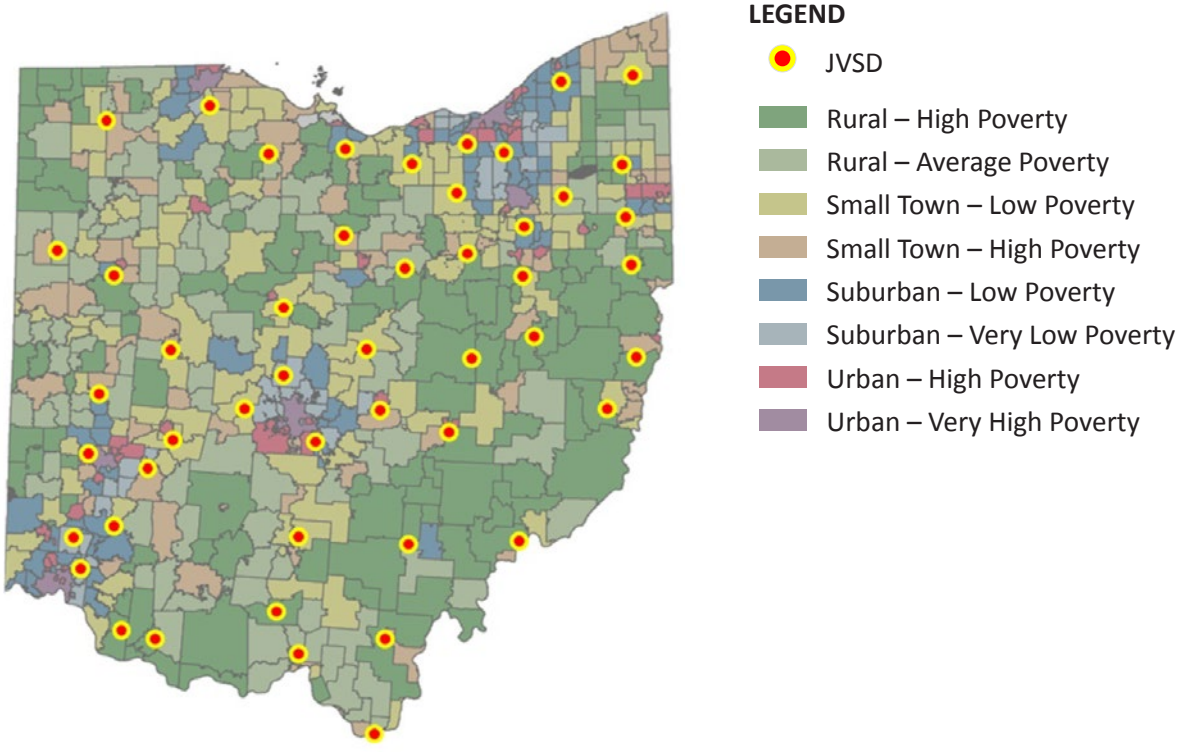
Table B3 shows the breakdown of CTE programming across different types of schools in Ohio.

Table B3. CTE participants served by school type

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Community School	1%	1%	1%	1%	1%	2%	2%	2%	1%
Compact/Contract	7%	7%	6%	5%	5%	4%	4%	4%	4%
Comprehensive, Non-voc	46%	46%	42%	42%	42%	42%	42%	43%	41%
Comprehensive, STEM	0%	1%	1%	1%	1%	1%	1%	1%	1%
Comprehensive, Voc. School	3%	3%	3%	2%	2%	3%	3%	3%	3%
Dropout Recovery	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	<1%
JVSD	43%	43%	48%	49%	49%	48%	48%	47%	50%

Figure B2 shows the locations of the JVSDs across the state. These schools are predominantly located in rural regions or small towns, which serve substantially different populations of students than the large, urban districts where most CTE participants in traditional, comprehensive schools are located.

Figure B2. Map of JVSDs in Ohio by urbanicity



Source: Adapted from Fordham Institute, Ohio By the Numbers and Ohio DEW Career-Technical Education Planning Districts Map

Table B4 presents data related to reimbursements made to JVSDs and traditional high schools for students earning IWIP and non-IWIP IRCs. In 2023, JVSDs received just over nine times more funding in the form of reimbursements than traditional high schools (on a per- school basis).

Table B4. IWIP and IRC reimbursement by school type

	2020	2021	2022	2023
IWIP Funding by School type				
Number of JVSDs receiving IWIP Reimbursements	49	48	49	49
Total IWIP Reimbursements to JVSDs	$3,139,375	$5,588,750	$8,673,750	$7,130,129
IWIP Reimbursement per JVSD	$64,069	$116,432	$177,015	$145,513
Number of traditional high schools receiving IWIP Reimbursements	46	63	83	159
Total IWIP Reimbursements to traditional high schools	$573,125	$1,323,750	$2,517,500	$2,797,084
IWIP Reimbursement per traditional high school	$12,459	$21,012	$30,331	$17,592
IRC (non-IWIP) Funding by School type				
Number of JVSDs receiving IRC Reimbursements	49	49	49	49
Total IRC Reimbursements to JVSDs	$2,066,682	$3,238,850	$3,695,364	$3,168,685
IRC Reimbursement per JVSD	$42,177	$66,099	$75,416	$64,667
Number of traditional high schools receiving IRC Reimbursements	147	138	204	351
Total IRC Reimbursements to traditional high schools	$930,873	$1,133,378	$1,628,992	$2,007,418
IRC Reimbursement per traditional high school	$6,332	$8,213	$7,985	$5,719

Source: Ohio DEW, Finance and Funding reports

WBL participants by group

Across each of the key groups of focus in this report, the proportion of those earning WBL hours aligns quite closely with CTE concentration rates (see table B3).

Table B5: WBL participation by student group

	2022	2023
Economically Disadvantaged	52%	54%
IEP or 504 Plan	25%	25%
Black	9%	13%
Hispanic	5%	6%
Homeless	5%	6%
English Learner	1%	2%