Meeting the Demand for New Workers—Investing in Career Related Learning for High School Students

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Donna Cooper and Stephen Herzenberg[1]

Executive Summary

Investing in public education excellence is the path to thriving communities, a stable economy, and successful students. Yet Pennsylvania's underfunded and decentralized K-12 career and technical education (CTE) and dual enrollment (in college as well as high school), and its Swiss cheese community colleges, undermine the Commonwealth's economic potential and the future of its students.

Reflecting these challenges, Pennsylvania ranks 42nd for the share of adults (25 and over) with more than a high school education. Nearly half of Pennsylvania adults (42.5%) have exactly a high school education but no education beyond that, the third-highest share of any state.

In 2018, to begin addressing these obstacles to students' success in college and career, Pennsylvania's State Board of Education set a goal of 60% of the population aged 25-64 having a postsecondary degree or industry-recognized certificate by 2025 — but the state is only at 47%.[2] Illinois set its 60% goal six years earlier and is now at 55.2%.[3] Simply put,

[1] Donna Cooper is the executive director of Children First (https://www.childrenfirstpa.org/) and Stephen Herzenberg is the executive director of Keystone Research Center (https://krc-pbpc.org/). Both they and their organizations are partners in the Pa School Works campaign (https://paschoolswork.org/).

[2] For the goal, see https://www.stateboard.education.pa.gov/Documents/About%20the%20Board/Board%20Actions/2018/Attainment%20Goal%20Memo.pdf. For the estimate of 47%, see https://www.luminafoundation.org/state/pennsylvania/.

[3] The estimate of 55.2% comes from slide 7 of a September 30, 2022, presentation by the Education System Center, Northern Illinois University. The Lumina Foundation reports Illinois as at 52.2%; see https://www.luminafoundation.org/state/illinois/. See also https://p20.illinois.gov/about.html.

Pennsylvania lacks an intentional statewide career pathway system that ensures alignment of all available resources to meet its 60% goal. That system is what the state should now create by adopting the recommendations of this brief.

Fifty years ago, a high school education sufficed for jobs in the mills and mines and was supplemented by on-the-job learning within a one-company career. That world is long gone. Today, success for individuals, businesses, and state economies all hinge on getting more than a high school education and getting more out of that education. These realities and Pennsylvania's current, low standing underscore the vital importance of strengthening career pathways and dual enrollment to ensure more students gain skills in high school that give them access to earning postsecondary education credits and/or skills credentials before they graduate.

Ninety percent of all K-12 students in Pennsylvania attend public schools. That means that 1.7 million students' futures are tied to the effectiveness of the infrastructure of public education. Pennsylvania students perform above the national average on the National Assessment of Educational Progress. On measures such as high school graduation rates and student achievement, well-resourced schools across Pennsylvania far exceed the state average.

Pennsylvania's achievement numbers, however, mask some of the largest opportunity and achievement gaps in the country. While pockets of excellence, largely correlated with pockets of adequate funding, tell us that Pennsylvania public schools and students succeed with sufficient resources, our commonwealth, as a whole, is performing far below our students' potential due to widespread underfunding, which disproportionately harms our most vulnerable children.

A key area in which state funding is inadequate, and the resources and programming available to students varies widely by community and school district, is career and technical education. Although Pennsylvania has many of the elements that could support a robust, state-supported career pathway system that ensures a majority of high school students can benefit from the proven impact of career-related learning, the share of students able to take advantage of these promising approaches to learning is far too small, reaching less than 7% of high school students.

Over the last 30 years, state statutes and the State Board of Education have codified some key elements of a career pathway system, such as the state goal that 60% of adults 25-64 have a postsecondary degree or industry-recognized certificate by 2025. Moreover, in some areas of the state, nascent infrastructure such as career pathways programs integrated

with CTE, and strong connections to the business community are in place (see box 1 below). Even so, students' access to this advanced method of learning is a third of the 19% average in our six surrounding states.

The Commonwealth needs to align the work of key state agencies and external partners to build a career pathway system that leverages the capacity and resources of high schools, regional technical training schools, private employers, community colleges, and apprenticeship and training programs. Inside state government, at a minimum, the state must create an office that has the authority to connect and build on the current expertise in the Departments of Labor and Industry, Education, and Community and Economic Development.

Pennsylvania can emulate effective practices that are now widely deployed in other states and within four years provide at least 50% of all high school graduates the benefits of career-related learning, meeting Governor Shapiro's goal of "drastically increasing" CTE. Achieving this goal and creating a sustainable CTE infrastructure for the 21st century would require increasing state funds by $230 million, including:

- a $200 million increase in CTE funding.
- an $11 million annual increase in funding for equipment to career and technical centers (CTCs) and other CTE programs.
- funding for a statewide intermediary like the Education Systems Center at Northern Illinois University, which has supported successful state career-related learning and dual enrollment strategies in Illinois for the past 11 years.
- $10 million for competitive grants to increase dual enrollment.
- $1 million to allow $1,000 per student for the start-up costs associated with increasing high school pre-apprenticeship enrollment annually.
- $8 million for direct subsidies or tax credits to strengthen business-led and business- and labor-led sector partnerships that can partner with CTE, ensuring that more high school pre-apprenticeships and other career pathways connect with living-wage careers and meet employers' skill needs as well as increasing post-secondary enrollment.

The High Payoff of Career-Related Education

Study after study shows that where states and public schools do it right, career-related learning boosts student outcomes.[4] Specifically, the data show that students with greater exposure to CTE are more likely to graduate from high school, enroll in a two-year college, be employed, and earn higher wages.

- CTE is not a path away from college. Students who take more CTE classes are just as likely to pursue a four-year degree as their peers.
- Students who take more than two CTE courses in high school are 21% more likely to graduate high school compared to otherwise similar students (and see a positive impact on other outcomes).
- CTE provides the greatest boost to the kids who need it most: boys and students from low-income families.

State-of-the-art career pathway systems across the country have four essential elements, each driven by state leadership, as shown on the next page:

[4] For a brief summary of the research literature on the impact of CTE on student outcomes and academic citations, see Shaun M. Dougherty, "Career and Technical Education In High School: Does It Improve Student Outcomes?" Thomas B. Fordham Institute, 2016, especially p. 12 and notes 14-21, http://edex.s3-us-west-2.amazonaws.com/publication/pdfs/%282016.04.07%29%20Career%20and%20Technical%20Education%20in%20High%20School.pdf. On the payoffs to CTE, see also U.S. Department of Education, "Bridging the Skills Gap: Career and Technical Education in High School," Data Story, U.S. Department of Education, 2019, https://www2.ed.gov/datastory/cte/index.html.

Infrastructure and Resource Alignment	High School-Embedded Career/Tech Education that Leads to Industry Certifications	College Credit High Schools Options that Lead to Industry Credentials	High School Pre-apprenticeship and Apprenticeship Options
State infrastructure – funding, centralized program support (e.g., on career pathways, curricula), and state support for business/industry partnerships	Traditional CTE programming intensively connected to employers offered in traditional high schools or regional training centers	Dual enrollment programs that focus on degree completion upon or near graduation and that align with a robust articulation system	Pre-apprenticeships connected to apprenticeships and to post-high school employment that are offered to high school students beginning in 11th grade

Infrastructure and Alignment of Resources

Pennsylvania has weak state funding and statewide program support for career-related learning, which puts the onus of creating strong, career-related learning opportunities on school districts and regional career and technical centers. The weaknesses of the current system constrain the deployment of employer and higher education resources that could enable the Commonwealth to expose a strong majority of high school students to career-related learning before graduation. The absence of strong state infrastructure also creates significant inequity of opportunity across the state.

Leading states and countries heavily invest in centralized program supports that facilitate effective employer and industry engagement in the design of CTE and apprentice/pre-apprentice course content and also ensure the content is high-quality. One example of such centralized support can be found at Northern Illinois University (NIU).[5] Over the past decade, the Education Systems Center at NIU has been charged with spurring

[5] This paragraph on the NIU Education Systems Center is based on a presentation by Jonathan Furr made on "Fostering a Pathways Ecosystem" in Illinois and an interview with Jonathan Furr in February 2023. The Center's website has additional resources, including videos: see https://edsystemsniu.org/.

improvement in the career pathway experiences offered through Illinois' career and technical education system in partnership with community colleges across the state. As well as mapping career pathways in "high priority occupations" within targeted industries, the university also develops policies and partnerships that increase dual credit and provides data collection and evaluation to improve pathways and student progress. This intermediary also provides state-of-the-art training options for students across the state and ensures high quality course content for students in career-related learning. It thus provides economies of scale and scope so that each individual school district and local business–education partnership does not need to separately map career pathways and develop curricula. From 2014 to 2019, the system-building in Illinois to help more students become college and career ready has helped lower the share of Illinois community college enrollees taking at least one remedial course from 49.4% to 39.1%. Enrollment levels in at least one dual credit course have risen by 24% overall, 39% for Black students, and 64% for Hispanic students.

It is noteworthy that Pennsylvania does invest in regional industry partnerships, business-education partnerships, and multi-employer apprenticeships at a modest level, which in some cases facilitates coordination with CTE and K-12 more generally. As box 1 illustrates (on the next page) in the case of career pathways, these seed funds have helped create model programs in some schools and counties, setting the stage for complementary investment in a statewide center. In the extended discussion of pre-apprenticeships below, we also include specific proposals to scale Pennsylvania's industry-led workforce partnerships so that industry has more capacity to partner with education and training organizations, including high schools.

High School-Embedded Career/Technical Education: Pennsylvania has a decentralized approach to traditional, career-related training, which has the benefit of connecting learning to local labor market demands. However, it also means that the quality and breadth of programs is highly dependent on the quality of local leadership. And it goes along with Pennsylvania's decentralized approach to organizing business-led industry partnerships, which are essential to ensuring quality training for high school students.

College Credit Options in High School: Launched in 2006, the state's dual enrollment system remains highly underfunded, under-developed, and often underutilized by the students for whom this option is the best vehicle for ensuring postsecondary success. Moreover, because the state lacks a central planning infrastructure for all high school career-related learning options, district-level and state-level dual enrollment discussions and resources are disconnected from career and technical education programs.

Box 1. Pennsylvania Is Primed to Take Career Pathways to Scale

In the late 2010s, the Pennsylvania Workforce Development Board commissioned a study to identify ways the state could support the development of strong career pathways statewide.[6] That study found an impressive amount of career pathways activity going on in Pennsylvania, including in school districts.

Allen Norton, the Pennsylvania Chamber of Business and Industry's Workforce Development executive, points to Middletown School District near Harrisburg, a comprehensive school (i.e., not a CTC), as a model.

After exposure to the pathways that starts in middle school, students select one (although they can usually change their pathway later) and then select their high school electives informed by that choice. Students participate in experiential learning, job shadowing, and college visits aligned within their pathway. Some pathways have made a big impact on career choices.

More than 150 students have graduated from Middletown with a certified nursing assistance (CNA) credential, enrolling in a course at Harrisburg Area Community College, working at a nearby elder care facility, and sitting for the CNA exam before graduation. While older, out-of-school adults can get locked into these entry-level jobs at low pay, Michael Carnes, then Middletown principal, said in 2020, "A lot of those students are in the nursing field today." They advance beyond getting a CNA because they had a career plan before leaving high school and could navigate the educational requirements of nursing. When asked "do you feel like Middletown helped you become career ready?" more than 80% of Middletown students say yes.

The Career Ready Berks alliance (CRB) is one of a growing number of countywide career pathways initiatives. The alliance works with 18 school districts and two regional career training centers, the Reading Area Community College, the local workforce board, a business–education coalition, and the Berks Intermediate Unit (https://careerreadyberks.org/). In just two years, Berks recruited 180 employers to collaborate with schools, capitalizing on relationships built with local employers.

A central part of BRCA's mission is putting career readiness information at students' fingertips equitably across all 18 of the county's school districts—which vary a lot in income and wealth levels. The Berks framework outlines career pathways activities from elementary school to high school. It also maps out work-based learning and post-secondary experiences that high schools can integrate into their career pathways. Through an articulation agreement with Reading Area

[6] A recent overview of career pathway activity in Pennsylvania, linked with high schools and with education and training for adults, found that there are many exemplary career pathways programs at the secondary and post-secondary levels but that these remain the exception, not the rule, and the state has not yet developed mechanisms to move model programs beyond pockets within the state. See Keystone Research Center, "Towards an Industry-Driven and Student- and Worker-Centered Vision of Career Pathways in Pennsylvania," October 2020, https://www.dli.pa.gov/Businesses/Workforce-Development/wdb/Documents/PA-WDB-KRC-Career-Pathways.pdf.

Community College, courses offered by the Berks or Reading–Muhlenberg Career & Technology Centers enable students to graduate high school with 27 college credits. Berks County also has an extensive teacher in the workplace program: one-day shadowing opportunities for teachers during the school year and a five-day intensive job shadowing in the summer with a stipend. More than 500 teachers participated in the two years prior to COVID, most of them non-CTE teachers from the full gamut of disciplines. The initiative fulfills PDE career readiness requirements and uses, as does Middletown, the five pathways defined by PDE (arts and communications; business, finance, and information technology; engineering and industrial technology; human services; and science and health).

Countywide career pathways efforts are also taking place across the state in recent years (e.g., in Bucks, Erie, and Philadelphia).

One frustration expressed by Pennsylvania career pathways leaders and some business stakeholders: why doesn't the good career pathways work spread and scale? One answer: because state policies, funding, and technical assistance have not sufficiently supported "career pathways for all." The recommendations of this document aim to change that.

Apprenticeships: As part of the state's increased investment in apprenticeship and registered pre-apprenticeship over the past six years, a growing number of pre-apprenticeship programs for high school students now provide some promising pathways into apprenticeship post-graduation. At a planning level, however, these programs are not integrated into an overall high school career-related learning system in the state.

A Fragmented Community College Non-system: Pennsylvania's community colleges are another decentralized element of Pennsylvania's career and educational infrastructure. As elaborated in the section on dual enrollment, our community colleges cover only small geographic parts of the state, increasing challenges for dual enrollment programs and other career pathways that bridge secondary and postsecondary education. Along with a CTE system that creates a foundation for too few students to succeed in college and career, our community system contributes to Pennsylvania's unique educational attainment profile (table 1).

Table 1: The Achilles Heel of Pennsylvania Educational Attainment: the High Share of Adults (25 and Older) with No Education Beyond High School		
Educational Attainment Level	**Share of PA Adults (25 and older) with this Education Level**	**PA Rank Out of 50 States**
High school graduate or higher	91.4%	20
High school graduate (includes equivalency) but no postsecondary education	33.8%	3
More than a high school education	57.5%	42
Bachelor's degree or higher	33.1%	22
Graduate or professional degree	13.2%	16
Source: 2017-21 American Community Survey 5-Year Estimates. Data downloaded from https://www.census.gov/acs/www/data/data-tables-and-tools/subject-tables/.		

High School-Embedded Career and Technical Education

Pennsylvania has a traditional CTE infrastructure, which offers a useful foundation on which to build a strong career pathway system in the state, although it is currently too siloed from the broader postsecondary education system.

Just over 35,000 or 6.42% of Pennsylvania public school students in grades 9-12 are reported by the Pennsylvania Department of Education (based on federal data) as engaged in substantive career or technical education programs at regional Career and Technical Education Centers or at high schools where students focus a significant portion of their school day learning a skill that leads them to a career upon graduation.

Thousands more students take career or technical courses at some point in high school — but for the purpose of the Commonwealth's approach to supporting robust technical education in high school, this section focuses on students who concentrate in career-related learning and are categorized as such by the U.S. Department of Education because they take two or more career or technical learning courses in a year. Career-related concentrators show better outcomes than students who are less intentionally connected to career-related programs as demonstrated by research findings referenced in footnote 2.

PA CTE - Career-Related Concentrator Enrollment in Pennsylvania

Pennsylvania enrollment of 6.42% of all the state's high school students in career-related learning in intensive CTE programs ranks 36th out of the 50 states.[7] Our neighboring states enroll an arithmetic average of three times the Pennsylvania share in CTE (19.3%) (table 2). Pennsylvania also lags all but one of the other six states with the largest public school student enrollment in the nation (table 3)**.**

Table 2.

Career-Related Instructional Program Enrollment in States on Pennsylvania's Borders

State	Share of Students Enrolled in CTE Programs
Pennsylvania	6.4%
New York	7.2%
New Jersey	10.9%
Maryland	11.5%
Ohio	16.5%
West Virginia	33.0%
Delaware	36.7%
Source: Enrollment data downloaded from https://cte.ed.gov/pcrn/explorer; choose "Perkins V Enrollment Data."	

[7] The CTE enrollment data in tables 2 and 3 are derived from the federal Perkins Information Management System, which tracks the number of CTE concentrators by state. CTE concentrators are defined as students enrolled in career-related programs for two or more years. Pennsylvania's Department of Education independently documents all students who take one or more career-related courses, which they reported to be 65,536 students in grades 9–12 in 2021.

Table 3.

Student Enrollment in CTE Programs in the Six States with the Largest Grades 9-12 Public School Enrollment

State	Enrollment (Grades 9-12)	CTE Enrollment (Grades 9-12)	Share of Students Enrolled in CTE Programs
California	1,970,496	89,117	4.5%
Pennsylvania	548,002	35,156	6.4%
New York	814,902	58,364	7.2%
Illinois	605,609	93,012	15.4%
Florida	860,707	198,615	23.1%
Texas	1,611,209	663,172	41.2%
Source: Enrollment data downloaded from https://cte.ed.gov/pcrn/explorer; choose "Perkins V Enrollment Data."			

Funding for Traditional Career and Technical Education Programs in Pennsylvania

One factor contributing to low enrollment in career-related education is the method of funding programs in Pennsylvania. Total spending on career-related learning in Pennsylvania's public schools and regional career learning centers equals $920 million, of which:

- state funds for the career-learning subsidy account for only $79 million or 8.5% of the total funds spent for this purpose.[8]
- federal funds of $28.8 million help defray about 3% these costs.[9]
- local school district revenues account for nearly 89% of total funds available.

[8] The full name of the subsidy is the Secondary Career and Technical Education Subsidy (SCTES). For the 2022-23 funding amount, see https://www.education.pa.gov/Teachers%20-%20Administrators/School%20Finances/Education%20Budget/Pages/Secondary-Career-and-Technical-Education-Subsidy.aspx.

[9] See Perkins Collaborative Resource Network, "Pennsylvania State Profile," Fiscal Year 2022, downloaded from https://cte.ed.gov/profiles/pennsylvania.

The best evidence of the current CTE formula's obsolescence is the fact that, based on this formula, the Commonwealth *is* currently "fully funding" career-related learning. As box 2 explains, all that means is that the current CTE multipliers (around 0.2), which determine how much districts or CTCs receive per student enrolled in CTE, are too low. Some states use much higher multipliers than Pennsylvania when determining their CTE subsidy. For example, Texas uses 0.35.[10]

Section 2502.8 of the Public School Code defines the arcane formula the state uses to allocate the subsidy for CTE (see again box 2). Crafted in the mid-1960s, this law has been tweaked over time, but the fundamental approach has not been modified since the state began making career-related learning investments for public school students.

Box 2. Pennsylvania's Career-Related Training Funding Formula

The subsidy the state provides for career and technical education is small: 8.5% of total spending on career-related training in Pennsylvania's public schools. Pennsylvania provides a certain amount of funding per student enrolled in CTE, an amount that is more generous for lower-income and lower-wealth districts (as it should be). The problem is that the overall amount of funding per student is too low, discouraging districts from providing CTE or sending their students to career and technical centers.

The first part of the formula involves a computation of how many students are in CTE, by general type of CTE in which each student enrolls, which sets the "Vocational Average Daily Membership" (VADM). The VADM equals enrollment (average daily membership) in Career and Technology Centers (CTCs) multiplied by 0.2276 plus enrollment of students in vocational programs in a school district or charter school multiplied by 0.1844. The logic of this is that career-related education costs more to deliver than other high school courses; thus, the state provides a small supplement over and above the local funding that districts receive via the Basic Education Funding (BEF) formula.

The second part of the CTE subsidy formula multiplies CTE enrollment (i.e., VADM) by an amount of money. High-spending districts receive an amount that is approximately the state median Average Instructional Expenditure (AID) per Weighted Average Daily Membership. In FY 2022-23,

[10] "A Quick Glance at School Finance: A 50-State Survey of School Finance Policies (2018)," https://schoolfinancesdav.wordpress.com/. As cited in Pennsylvania Partnerships for Children, "Career and Technical Education: Setting the Standard in Pennsylvania," September 2020, https://www.papartnerships.org/report/report-setting-the-standard-for-career-and-technical-education-in-pennsylvania-september-2020/.

that amount was a little over $10,000.[11] Low spending districts receive what they actually spend in the district (i.e., their own AIW/WADM (which, since they are low spending, is below the State Median AIE/WADM).

The last part of the formula adjusts for the income and wealth of the district. It equals the greater of 0.375 and the market value/personal income aid ratio (MV/PI aid ratio). For poor districts, the MV/PI aid ratio goes as high as 0.84 (e.g., in Chester-Upland). Wealthier districts with MV/PI aid ratios below 0.375 use the 0.375 figure, thus providing a floor on the amount of funding per student in CTE that districts and CTCs receive.

An example: Northern Tioga School District has an AIE/WADM of $9,419, which is less than its BER of $10,145. It has a MV/PI Aid Ratio of 0.7277, reflecting its low levels of income and wealth, which is far above 0.375. And it has a VADM of 11.801, which means it has roughly 60 children in CTE. So its CTE subsidy is $9,419 times 0.7277 times 11.801 or $80,886.49 — i.e., not a lot of money for the extra costs of delivering CTE to those 60 children.

To drive more students into CTE, the Commonwealth must update and improve the CTE funding formula so that districts are paid more for each student that enrolls in CTE, which would remove the barrier to expanding career-related learning for high school students across the state.

The Inequities of Access to Traditional, Career-Related Learning in Pennsylvania

Although the Career and Technical Education formula takes into account the disparate needs of low-wealth, high-enrollment districts, the impact of adjusting for these factors is minimal since school districts must cover nearly 90% of CTE costs.

As a result, the career-related learning system suffers the same structural inequity as the state's Basic Education Formula, which results in greater CTE opportunities for students in high-wealth districts, who are disproportionately higher-income and white, than to students in low-wealth districts. Only 24% of all students in career-related programs are Black or Hispanic students compared to 30% of all 9th- to 12th-grade public students who are not white.

[11] The BER differs from the state median for AIE/WADM by a very small amount: $200 x ((Highest Equalized Mills – SD Equalized Mills)/(Highest Equalized Mills – Lowest Equalized Mills)). This very small amount varies from zero to $131, and BER varies from $10,237 to $10,106.

Policy Limitations of the Current Approach to Traditional, Career-Related Learning in Pennsylvania

The overreliance on local school district funding to support career-related learning can be moderated by ensuring that the Commonwealth adequately funds schools via the Basic Education and Special Education Funding line items. Doing this would relieve the pressure on local funds and help reverse the insufficient expenditure on career-related learning in the state's lowest-wealth school districts.

Further, the state formula funding for career-related learning must be reformed to incentivize school districts to create new programs, expand effective programs, and increase the share of students taking advantage of these programs.

Under the current system of funding, if students enroll in a regional career and technical center, those students' school district must remit payments to the regional program. Much like the challenge with the state's funding of charters — however, school districts have not "saved" the full amount they remit to the CTC for each student attending a CTC and thus must continue to carry a significant part of the costs of the sending school district.

As noted earlier, for Pennsylvania to even meet the average level of enrollment of our surrounding states, 19% of high school students would have to be afforded the opportunity to become career concentrators or at least three times the share of students currently taking advantage of career and technical education programs offered in Pennsylvania.

To provide career and technical training programs for 19% of Pennsylvania students, we need to boost the amount of state funding in the career and technical education line item from its current level of $79 million to at least $279 million on a recurring basis.

The combination of increasing the BEF and SEF line items and reforming the formula to increase CTE subsidy funding by $200 million (taking into account enrollment increases and an increase per student) would enable substantially more students from the lower-wealth school districts in the state to become career-related learning concentrators.

Further, the cost of equipment is a significant barrier to modernizing existing programs and creating new programs. The current level of state funding for equipment is $5.5 million, which is too parsimonious and allocated without regard to the local wealth of a district, capping equipment at $50,000 per year per program with a dollar-for-dollar local

match requirement. The Commonwealth can adopt innovative strategies that provide low-cost financing or direct payment options to ensure every program has what is needed. The state has not conducted an inventory of equipment needs. Tripling the level of enrollment, however, is likely to require additional equipment with an estimated cost of $16.5 million annually.

Element C: Dual Enrollment

The National Student Data Clearinghouse found that in 2022 immediate postsecondary enrollment rates decreased among high school graduates at every income and poverty level. Data from the previous year show there are also large gaps based on income and poverty level. Graduates of higher-income schools were more likely to enroll in the fall of 2021 than those in low-income schools: 64% vs. 49%. The gap is even wider between students at high-poverty schools and low-poverty schools: 46% vs. 72%.[12]

Meanwhile, the data show that when high school students are permitted to take college-level content before high school graduation, there are impressive post-secondary results. National data show that:

- students in dual enrollment courses were 10% more likely to complete a bachelor's degree than the comparison group.
- the benefits were even greater (12%) for students whose parents never attended college.[13]

The Department of Education reported that approximately 10,000 public high school students took a community college course while in high school, and the Pennsylvania State System of Higher Education (PASSHE) reported 760 high school students took at least one of their courses. That works out to fewer than 2.25% of all high school students earning college credit while in high school. In Illinois, by contrast, 24% of students enrolled in at least one dual credit course in 2020-21, an increase of nearly a fifth in just two years.[14]

[12] National Student Clearinghouse Research Center, (2022). High School Benchmarks 2022 - National College Progression Rates, https://nscresearchcenter.org/high-school-benchmarks/.
[13] Brian P. An, "The Impact of Dual Enrollment on College Degree Attainment: Do Low-SES Students Benefit?" *Educational and Policy Analysis*, (Vol. 35, Issue 1), 2013, https://eric.ed.gov/?id=EJ1009522.
[14] Presentation by the NIU Education System Center, slide 16, September 30, 2022.

The Commonwealth provides limited resources that enable high school students to enroll in higher education institutions to take credit-bearing courses or to take courses in their high schools that, via an agreement with a higher education institution, provide college credit. Per Act 55, every school district and charter high school must have at least one agreement in place by July 1, 2023.

The legislature recently appropriated $7 million for a competitive grant pool managed by PDE to support dual enrollment with a competitive preference available for schools where the enrollment is at least 25% students from low-income families. As of December 1, 2022, these funds were not yet deployed. The funds can be used for instructor salaries; books and materials; wraparound support services for students; financial assistance for secondary teachers to take additional graduate level courses to meet requirements to be approved as IHE instructors/faculty; and provision of services, support, and coordination of resources for established partnerships.

At a minimum, this level of funding should be sustained in FY 24 and grown to at least $10 million in the following year.

PDE's dual credit toolkit describes the full spectrum of options, although this resource has not been updated since Act 55 was enacted.[15]

Governors and secretaries of Education in southern states are examining policies and barriers to dual enrollment with the goal of expanding access to college course content in high school. Their thoughtful review of the infrastructure and supports necessary to expand access can be found at the source in the footnote.[16]

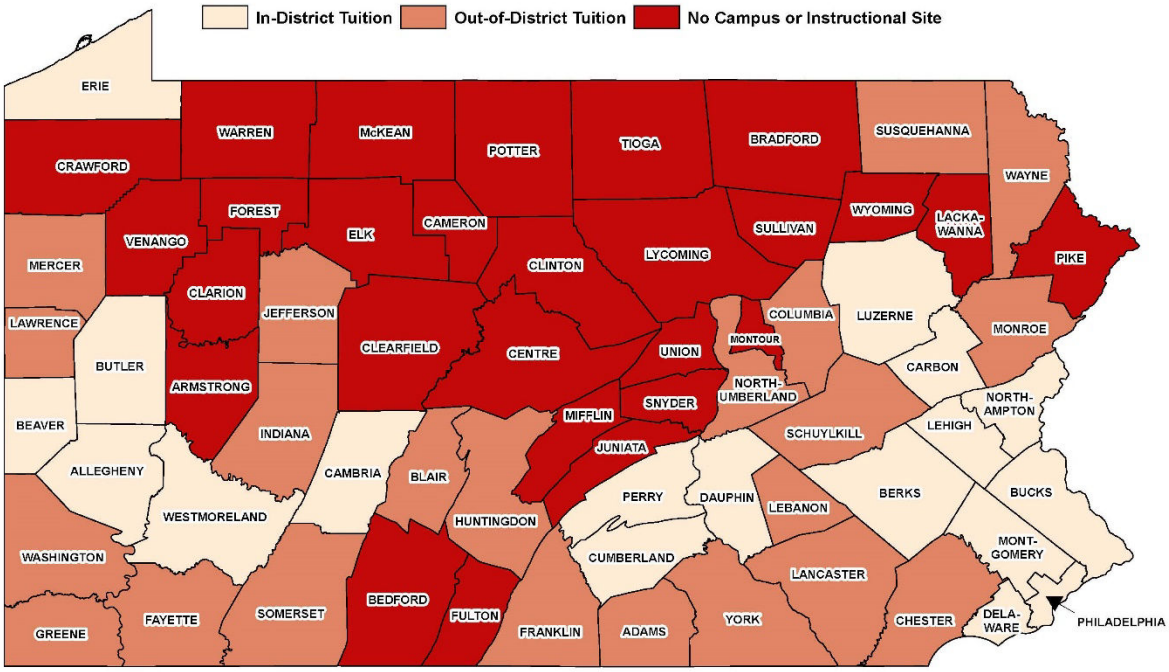
In some states, access to dual enrollment is more robust because they also have community college systems that more effectively reach all communities than in Pennsylvania. Twenty-seven of Pennsylvania's 69 counties do not even have a branch campus of a neighboring county's community college (see figure 1 on the next page). Further, in 49 counties, neither the county nor local school districts contribute funding to a

[15] Pennsylvania Department of Education, "Dual Credit Program Toolkit for Pennsylvania School Entities," December 2016, https://static.pdesas.org/content/documents/Toolkit_Dual_Credit_February_2017.pdf.

[16] Southern Regional Education Board, "Dual Enrollment Research: A Comprehensive Review," June 2020, https://www.sreb.org/sites/main/files/file-attachments/dual_enrollment_2020.pdf?1595860864.

community college, so if residents attend a community college they have to pay "double tuition." The Legislative Budget and Finance Committee (LBFC) estimates that 40% of Pennsylvania citizens live in a county or school district without a community college sponsor. In 21 of 26 counties that the LBFC labels rural, 50 or fewer students are enrolled at a community college.

Figure 1. Community College Access and Tuition in Pennsylvania



Source: Updated (to add Erie County Community College) based on Ginger Stull et al., "College Affordability in PA: How Did We Get Here, and What Can Be Done?" November 2016, 16. https://www.researchforaction.org/wp-content/uploads/2021/07/RFA-College-Affordability-PACER-Final-November-2016.pdf.

Element 4: Pre-apprenticeships and Apprenticeships

Expanding apprenticeship and pre-apprenticeship options linked with high school can be a central part of Governor Shapiro's plan to "drastically increase career and technical education" for high school students, triple state funding for apprenticeships, and expand Pennsylvania's industry partnership grants.[17]

Apprenticeships are an effective high school learning model widely embraced in Switzerland, Germany, and England. For instance, in Switzerland, 71% of high school students complete a formal apprenticeship in an industry before graduating. In fact, the Swiss point to their extensive apprenticeship system as the leading reason their youth unemployment rate is only 2.2%. More on the Swiss model can be found here.[18]

Growing apprenticeship and pre-apprenticeship options for high school youth can create additional pathways to good jobs in Pennsylvania, especially if the Commonwealth takes an intentional approach, ensuring that apprenticeships are articulated with college credit so they can also lead to additional youth getting post-secondary degrees. Apprenticeships give ready students the chance to build their skills onsite at an employer with academic content delivered in an approved manner by their school districts, a regional career training center, a community college, or a joint apprenticeship and training program that has gained accreditation as a post-secondary institution. Pre-apprenticeship offers an on-ramp to apprenticeship programs, helping students assess their interest in a specific industry, affinity for the work, and an understanding of the skills and credentials needed to work in that industry.

In 2016, the Pennsylvania Department of Labor and Industry (DLI) created an Apprenticeship and Training Office (ATO) to facilitate the expansion of adult and youth apprenticeship options. Starting in 2018, the legislature authorized $7 million annually from the PAsmart program, much of which has been used to provide grants funding apprenticeships and pre-apprenticeships. Since then, apprenticeship has been expanding in the state, both in geography and into different occupations and industries.

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[17] Shapiro for Governor website, "Josh Shapiro Releases New Plan to Expand Pennsylvania's Workforce, Address Labor Shortages, and Invest in Pennsylvania Workers," April 21, 2022, https://joshshapiro.org/news/pennsylvanians-are-hearing-about-josh-shapiros-plan-to-cut-taxes-and-lower-costs-all-across-the-commonwealth-2/.

[18] Jobs Now, "Swiss Style Vocational Education and Training: Voices from Companies, Governors, and CEOs," Summer 2017, https://www.amcham.ch/fileadmin/mrm/publications/171012_Jobs_Now.pdf.

The ATO established criteria for successful pre-apprenticeships and, since 2018, has formally registered pre-apprenticeship programs as part of expanding utilization of this learning model. In the past two years, grants funded by the ATO have specifically supported secondary school programs linked with regional "career pathway" systems, growing pre-apprenticeship across Pennsylvania. These grants include Schools-to-Work program awards aimed at deploying existing or new pre-apprenticeship programs to create a school-to-work pipeline.[19]

Last July, the United States Department of Labor (USDOL) awarded Pennsylvania $4 million from the Building America program to expand by 400 new registered apprenticeships and pre-apprenticeship opportunities for individuals aged 16–24. As one of four areas of focus, the state-funded PAsmart budget line item in 2020–21 also has "expanding apprenticeship and/or pre-apprenticeship initiatives in close alignment with secondary and/or post-secondary educational institutions."[20]

Act 158 of 2018 amended the Public School Code, establishing alternative pathways to high school graduation, stipulating that students can graduate if they also complete locally established minimum grades in courses that the Keystone exams measure *and* meet other criteria, including the successful completion of a pre-apprenticeship program.

As a result of increased funding and Act 158, pre-apprenticeships available to high school students have become more prevalent in Pennsylvania in recent years. At last count, since 2017, 56 pre-apprenticeship programs serving high school students in Pennsylvania have been registered. As the table on the next page shows, 19 pre-apprenticeships (bolded in black) are sponsored by public high schools, including regional career and technical centers. Three additional pre-apprenticeships sponsored by entities other than public high schools (bolded in red) target primarily public high school students. An additional 34 (not shown in the table) of Pennsylvania's 97 pre-apprenticeships serve some public high school students and also serve other populations.

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[19] PA Department of Labor and Industry, Available Grant Opportunities, https://www.dli.pa.gov/Businesses/Workforce-Development/grants/Pages/default.aspx.

[20] PA Smart Grant: Building Apprenticeship and Pre-apprenticeship Programs, Remake Learning, https://remakelearning.org/opportunity/2021/10/13/pa-smart-grant-building-apprenticeship-pre-apprenticeship-programs/#:~:text=%2411.5%20million%20is%20available%20to%20build%2C%20support%20and,and%20expedited%20growth%20through%20multi-county%20or%20statewide%20initiatives.

Table 4.

Pre-Apprenticeship Programs in PA Targeting Youth in Public High Schools			
(Programs in black are sponsored by public HS's; programs in red, are sponsored by other entities.)			
Occupation	*Approved*	*Industry*	*Pre-apprenticeship Sponsor*
Tool & Die / Machinist	7/16/2019	Mfing	Crawford Tech
Electrician	7/16/2019	Constr.	Crawford Tech
Machinist	12/13/2019	Mfing	Erie HS / Erie Public Schools
Machine Operator	12/13/2019	Mfing	Venango Technology Center
Heavy Equipment Oper.	12/18/2019	Transport.	Connellsville Area CTC
Struct. Metal Fab'r/Fitter	2/13/2020	Mfing	Franklin County CTC
Machinist	3/1/2020	Mfing	Venango Technology Center
Machinist	6/10/2020	Mfing	Central PA Inst of Science & Tech. Ctr
Machinist	6/10/2020	Mfing	Columbia Montour Area Vo. Tech.
Machinist	6/10/2020	Mfing	Jersey Shore Area Senior HS
Machinist	6/10/2020	Mfing	Keystone Central SD and CTC
Machinist	6/10/2020	Mfing	SUN Area Technical Institute
Combination Welding	9/1/2020	Mfing	Venango Technology Center
Machinist	11/20/2020	Mfing	Williamsport Area High School
Carpenter	5/17/2021	Constr.	Pittsburgh Public Schools
Electronics Technician	5/25/2022	Mfing	Venango Technology Center
Trades	5/26/2022	Constr.	Chester County Tech. College HS
Pastry Cook	8/15/2022	Hosp./Tour.	Lebanon County CTC
Cook	8/15/2022	Hosp./Tour.	Lebanon County CTC
Industrial Mfing Tech.	12/13/2019	Mfing	Catalyst Connection
Electrical Trade	4/1/2021	Constr.	Central PA Ind. Elec. Contrs
Adv. Ind. Mfing Tech.	3/24/2022	Mfing	Catalyst Connection
Source: Pennsylvania Apprenticeship and Training Office			

One challenge for high schools that want to expand pre-apprenticeship, apprenticeships, and other programs that combine classroom education with workforce development programs (e.g., internships and summer jobs) is that businesses are atomized and too busy to invest the time schools need to understand businesses' skill needs and align CTE curricula.

From 2005 to 2008, the state provided $20 million annually (the equivalent of $28 million today because of inflation) for business-led industry partnerships to align the training infrastructure with employer needs and create the course content needed to ensure businesses a ready supply of well-trained new workers. Funding for industry partnerships has since been as low as $1.6 million in some years.

A more robust approach than budget line items for grant funds that tend to be small and are at risk in every budget — an approach suited to a governor interested in "drastically increasing" career-related education and in transformational change — would be to engage business and labor in the development of a shared funding approach (e.g., via a tax credit or a "pay per apprentice" or "pay per pre-apprentice approach) that would "institutionalize" support for business-led industry partnerships and multi-employer apprenticeships and for high school pre-apprenticeships and apprenticeships.[21] The Commonwealth can also look to national technical assistance organizations like Careerwise to help increase its capacity to build these partnerships as the state builds its internal capacity to prepare at least 5,000 high school students as apprentices or for apprenticeships upon graduation.

A key component of a state-led career related learning system should include a performance management system that includes a pre-apprenticeship tracking system (with the number, diversity, occupational, and industry breakdown of high school pre-apprentices) and concrete goals for the expansion of pre-apprenticeship in high schools by the end of 2026. The Commonwealth should also ensure that pre-apprenticeships and other CTE investments target apprenticeships and jobs that can support a family and provide good-paying entry-level wages.

[21] A new national coalition dedicated to scaling apprenticeship to the kinds of levels seen in England and Australia (countries, like the U.S., with little apprenticeship 20 years ago) shares the view that "discretionary grant funding will not move the needle" and favors a pay-per-apprentice subsidy. See, Apprenticeships for America, "Scaling Apprenticeships with a Pay-Per-Apprentice System," no date.

The new administration should implement a pre-apprenticeship tracking system and establish a baseline estimate and then establish goals for the expansion of pre-apprenticeship in high schools by the end of 2026.

The ATO is developing a database to track pre-apprenticeship and expects to be able to estimate the number of participating high school students relatively soon. To get a sense of the possible order of magnitude, if we assume that the 56 pre-apprenticeships serve an average of 15 high school students, then 840 high school students now participate in pre-apprenticeship in Pennsylvania. If one assumes pre-apprenticeships last one of the four high school years, the target population is the grade 9-12 population divided by four (548,000/4 = 137,000): 840 is about 0.6% of this target population. If one considers the target CTE population to be one-half of the 35,156 in the Perkins count of PA students in CTE for at least two years, then pre-apprenticeships enroll 4.8% of CTE students.

Since high schools already receive CTE funds, the subsidy for pre-apprenticeships could be limited to supporting *increases* in the number of high school pre-apprentices rather than being a permanent subsidy for each high school pre-apprentice. This approach makes sense if one considers regular CTE funding to cover ongoing pre-apprentice classes but not to cover the start-up costs of establishing or expanding apprenticeships, including aligning curriculum with industry and industry-recognized credentials, partnering with employers to organize visits to work sites and apprenticeship programs, or paid summer or year-round employment.

If the state aims to increase the number of pre-apprentices by 1,000 per year over the next four years — reaching 5,000 students and roughly a seventh of the current CTE enrollment (based on the Perkins number) by the end of 2026–27 — and provides $1,000 per student for the increase in annual pre-apprenticeship enrollment, the cost would be $1 million per year. A more rapid increase might be desirable as part of the broader strategy to expand CTE, including programs that lead to apprenticeships. But starting with a budget allocation of $1 million would allow the state to observe the absorption and growth capacity of CTE programs that deliver pre-apprenticeships and to implement a tracking and performance evaluation system before it invests larger amounts annually.

To scale apprenticeship and pre-apprenticeship, the state should provide direct per-participant funding. Many other states use tax credits or direct grants for apprenticeship, which are typically at levels of $1,000 to $2,000 per person per apprentice, ordinarily to

cover a portion of the cost of the classroom ("related instruction") component of apprenticeships.

Example: In 2018, Maryland had a draft bill that sought to establish a tax credit of $1,000 per youth apprentice for the first year of apprenticeship. The bill set a goal of 45% for CTE completion by high school graduates, twice the then-current 23% for Maryland high school graduates who complete a CTE program, an apprenticeship or an industry skill certification.[22]

Separate from investments in high school CTC or pre-apprenticeship, the state should use grants or tax credits to increase support for industry partnerships and group apprenticeships, which would expand the number of business-led intermediaries with sufficient capacity to partner effectively with CTE programs in high schools.

As the state expands investment in high school pre-apprenticeship and apprenticeship, it must ensure that this investment targets apprenticeships and jobs that support a family and provide good-paying entry level wages. Without safeguards, programs and high school apprenticeship/pre-apprenticeship — like Pell grants for college and workforce funding — can end up subsidizing education and training that leads to low-wage, high-turnover positions such as nurse aid, truck driver, or other jobs. High-turnover employers that pay and manage poorly, by the standards of these industries, have the most insatiable appetite for newly trained students and workers because they have such high quit rates.[23]

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[22] Maryland General Assembly, Department of Legislative Services, *Career and Apprenticeship Opportunity Act of 2017*, 2017 session, https://mgaleg.maryland.gov/2017RS/fnotes/bil_0005/sb0335.pdf. Also see page 40, Stephen Herzenberg and Diana Polson, *Ten Ways to Make Apprenticeship Central to Learning and Careers in 21st Century Pennsylvania*, Keystone Development Partnership, July 2019, https://krc-pbpc.org/wp-content/uploads/KRC-Policy-Report-Final-10-18-19.pdf.

[23] See Laura Dresser, Hannah Halbert, and Stephen Herzenberg, "High Road WIOA: Building Higher Job Quality Into Workforce Development," December 2015, https://krc-pbpc.org/wp-content/uploads/KRC_WIOA.pdf.

Conclusion

Pennsylvania has a fragmented, underfunded high school career-related education system. This undercuts success in college and careers for hundreds of thousands of students annually, while exacerbating skill shortages for businesses and throttling Pennsylvania's economy.

Pennsylvania also has a legislature that supports career-related education on a bicameral, bipartisan basis, a governor that wants to "drastically increase" CTE, and a body of experience with industry-led workforce intermediaries beyond most states.

Through strategic and integrated investment and system-building in career-related education in K-12 public education, Pennsylvania can leapfrog other states, expand the horizons and futures of Pennsylvania students, and enable our businesses to thrive. It's time for Pennsylvania's new legislature and new governor to get started.