EXPANDING CTE PATHWAYS REQUIRES PRIORITIZATION AND A PROGRAM-SPECIFIC APPROACH

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CENTRAL QUESTION

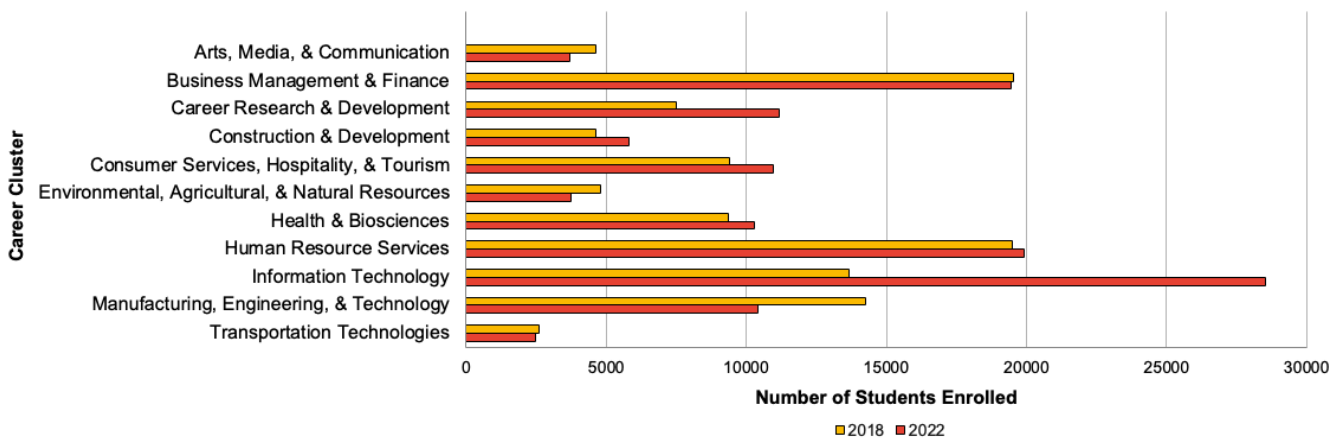**How can school districts expand Career and Technical Education programs amid resource constraints?**

Career and Technical Education (CTE) programs aim to provide students with skills that will prepare them for career success in a competitive economy.[1] Although CTE has historically been stigmatized as a "place for low-performing students,"[2] that notion has been dispelled by recent evidence that CTE participation increases students' graduation and employment rates and wages.[3] These positive education and wage effects hold for Maryland public high school graduates.[4]

Aligned with broader national trends,[5] Maryland CTE enrollment is on the rise. Between 2018 and 2022, enrollment increased overall from 109,808 (42.3% of students) to 126,504 (44.6% of students)[6] and grew in most career clusters (i.e., groupings of careers with shared features) (Figure 1).[7] But the percentage of students enrolled in CTE varies dramatically by district (Figure 2).[8]

Maryland's comprehensive education reform known as The Blueprint for Maryland's Future mandates that the state's 24 school districts offer a "robust set of CTE programs that allow students to earn an industry-recognized credential or postsecondary certificate, including completing the high school level of a registered apprenticeship program."[9] By 2030-31, 45% of high school students must earn an industry-recognized credential (e.g., firefighter certification) or complete an apprenticeship (i.e., working for a registered employer while receiving training)—a dramatic increase from 2021 statewide completion rates for both industry credentials (6.53%) and apprenticeships (0.28%).[10]

The CTE Committee oversees CTE expansion as part of its charge to develop an "integrated, globally competitive framework for providing CTE to Maryland students."[11] Yet, at the time this brief was published, the committee had not offered recommendations for what CTE programs districts should expand; those decisions were within districts' purview. This brief draws on a review of districts' 2023 and 2024 Blueprint implementation plans to explore what CTE programs districts are planning to expand, the challenges

Figure 1. Number of Students Enrolled in CTE Career Clusters in 2018 and 2022

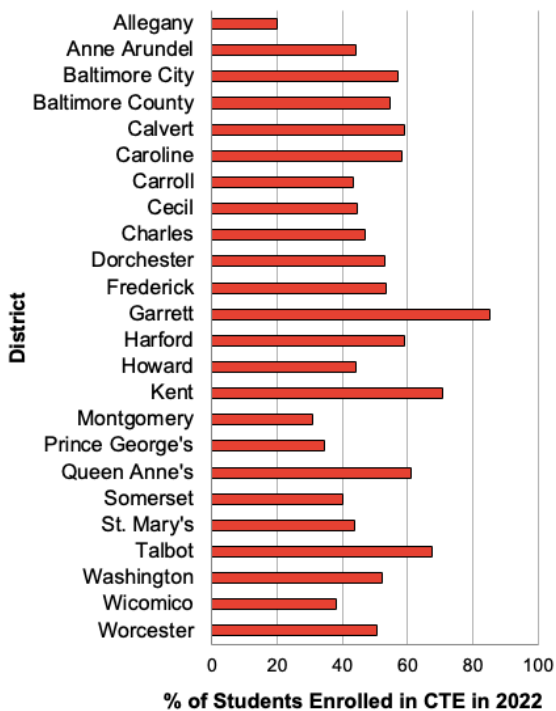*Source:* Maryland State Department of Education (2023).

they are facing with expansion, and the strategies they are using to overcome those challenges.

KEY FINDINGS

Not all districts are planning to expand CTE offerings.

At the time 2023 Blueprint implementation plans were submitted, Maryland districts offered between 10 and 51 CTE programs.[12] When asked what factors they considered when adding or modifying programs, all but one district cited community needs. Districts described collaborating with local businesses and reviewing local data to ensure that programmatic changes aligned with workforce needs. For example, Washington County Public Schools added a Diesel Technology program in 2022 in response to local and national shortages of certified diesel technicians.

**Figure 2. Percentage of Students Enrolled in a CTE Program by District in 2022**

Source: Maryland State Department of Education (2023).

But while CTE expansion is a primary goal of the Blueprint, just 17 districts were planning to expand programming in the coming years—15 of which were planning to add or expand fewer than five programs (Figure 3). Furthermore, 17 districts had one or more programs that did not offer an

industry credential or apprenticeship. Baltimore City Public Schools had the highest number of anticipated CTE offerings, which included new programs (e.g., computer science) and expansions of existing ones (e.g., automotive technician). Districts did not explicitly state their reasons for expanding programs (or not), but challenges with staffing and facilities—described in the following sections—appeared to be major factors.

Figure 3. Current and Anticipated CTE Offerings by District
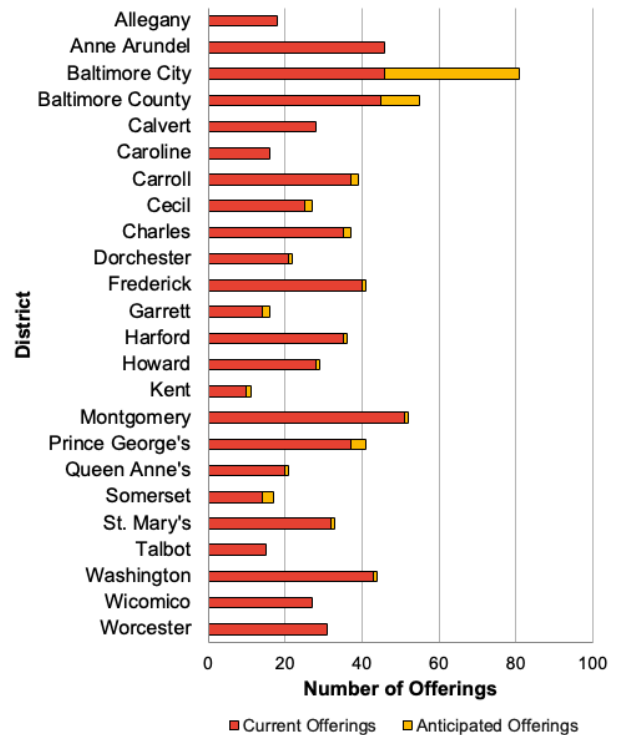
Source: Districts' 2023 Blueprint implementation plans.

Staff shortages and facilities constraints are making it difficult for districts to expand CTE offerings, but these challenges are program-specific.

Nineteen districts described issues with recruiting, training, and retaining CTE teachers—particularly in programs where industry salaries were substantially higher than teachers' salaries. Calvert County Public Schools, for instance, described how staffing was most challenging in information technology, healthcare, engineering, and construction programs. Other districts noted that CTE teachers with extensive industry experience often have limited teaching experience and require additional (costly) training. Several districts also described challenges with staffing

non-teaching positions, including those responsible for identifying and placing students in apprenticeships.

Fifteen districts highlighted facilities constraints as a challenge with expanding CTE. While many described facilities constraints in general (e.g., lack of classroom space), a few described program-specific constraints. For example, Baltimore City Public Schools wrote that many "high-wage, high-skill occupations" require specialized labs and equipment that their current infrastructure cannot support. Limited funding to build new and renovate existing facilities undergirded these challenges.

Most districts' strategies to overcome staffing and facilities challenges are not program-specific.

The strategies districts described to address staffing and facilities challenges were, for the most part, not aligned with the program-specific problems at hand. For example, districts described targeting recruitment to career changers, recent retirees, and unions, but did not discuss differentiated strategies for prospective CTE teachers in high-wage industries. To address facilities constraints, districts most often described using local funds, grant monies, or philanthropic donations to build new facilities or transform existing ones. Just a few districts described program-specific strategies, like Caroline County Public Schools, which reconfigured its course schedules so its Construction and Advanced Manufacturing programs could share a Computer Aided Design and Drafting (CADD) lab.

RESEARCH METHODS

This brief draws on a qualitative analysis of publicly available documents describing efforts to implement Blueprint initiatives and the challenges with doing so. These documents include the implementation plans districts submitted to the Accountability and Implementation Board (AIB) in 2023 and 2024, districts' responses to feedback on these plans from the AIB and the Maryland State Department of Education, reports districts submitted to the AIB regarding implementation progress, and the CTE Committee's implementation plan. Our team continues to update this research process as additional information is made available by the AIB. This brief draws on data that address districts' CTE offerings and plans for expansion. We analyzed these data using both deductive codes derived from questions the implementation plans asked of districts

(e.g., challenges with expanding CTE offerings) and inductive codes derived from a preliminary review of the data (e.g., facilities challenges).

POLICY RECOMMENDATIONS

Prioritize expanding programs aligned with workforce needs and research evidence.

The staffing and facilities challenges districts are facing with expanding CTE could limit not only their ability to expand programs but also the quality of programs they offer—a key moderator of CTE programs' positive outcomes.[13] Thus, districts should prioritize offering programs that are best aligned with workforce needs—as many are already considering—and evidence about what programs offer a return on investment at both individual and societal levels. Evidence from Maryland points to several career clusters and programs that have improved graduates' education and wage outcomes, including **health-related** programs[14] and programs in **Business Management and Finance**, **Construction and Development**, and **Transportation Technologies** career clusters.[15] Additionally, ongoing research from the Maryland Equity Project found that the **Teacher Academy of Maryland** (TAM) has positive effects on wages *and* on becoming a teacher, particularly for Black girls. This evidence suggests that investments in TAM may also help to address underlying concerns about staffing shortages—in CTE and other areas—by producing more teachers.

Information technology (IT) is another clear area for expansion, given rapid employment growth in the computer and information technology sector.[16] However, districts must attend to equity in access to and take-up of IT programs to combat the gender, racial/ethnic, and geographic disparities that plague this field.[17]

Create a salary structure with the potential to recruit CTE teachers in high-wage industries.

The Blueprint is raising teachers' base salaries and improving salary growth opportunities through a career ladder, but these new structures may not be enough to recruit and retain CTE teachers in high-wage industries that align with programs targeted for expansion, like IT.

As the CTE Committee described in their 2023 implementation plan, the new career ladder may limit CTE teachers' growth opportunities because it is based on National Board Certification—which offers a limited number of industry specializations for CTE teachers—and does not consider industry-recognized credentials.[18] Accounting for these credentials in the career ladder could support the recruitment and retention of CTE teachers by raising their earning potential.

Offer virtual or hybrid CTE courses where feasible.

Districts could capitalize on the distance learning infrastructures they developed during the COVID-19 pandemic and offer some CTE courses in virtual or hybrid formats. Although this approach is not suitable for all programs, it is one way to sidestep or alleviate the facilities and staffing constraints plaguing districts. Advance CTE's recent "Policy Playbook" provides guidance on and examples of states' efforts to increase virtual and hybrid course and work-based learning opportunities. For example, Missouri offers virtual pathways for teaching, market, business, and computer science, and will offer others including agribusiness, construction, and health science in coming years.[19] Offering these and other similar programs in virtual or hybrid formats could make it possible for more students to enroll in them while also preserving the limited space districts have available for programs that require in-person learning.

Endnotes

[1] Dougherty, S. M. (2016). *Career and technical education in high school: Does it improve student outcomes?* Thomas B. Fordham Institute.

[2] Dougherty (2016), pp. 8.

[3] Castellano, M. E., Richardson, G. B., Sundell, K., & Stone III, J. R. (2016). Preparing students for college and career in the United States: The effects of career-themed programs of study on high school performance. *Vocations and Learning, 10*, 47-70. Dougherty (2016). Kreisman, D. & Stange, K. (2017). Vocational and career tech education in American high schools: The value of depth over breadth. National Bureau of Economic Research Working Paper No. 23851.

[4] Witzen, B. H. (2019). *The effect of high school career and technology education on postsecondary enrollment and early career wages.* Maryland Longitudinal Data System Center.

[5] Wall, P. (2024, February 9). States bet big on career education, but struggle to show it works. *The Washington Post.*

[6] Maryland State Department of Education (2023). *Participant enrollment in Maryland public schools* [Data set].

[7] Maryland State Department of Education (2021). *Maryland career and technical education programs of study.*

[8] Maryland State Department of Education (2023).

[9] Accountability and Implementation Board (2022). *Blueprint for Maryland's Future: Initial comprehensive implementation plan*, pp. 119.

[10] Career and Technical Education (CTE) Committee (2023). *Blueprint for Maryland's Future: Initial phase one implementation plan.*

[11] Career and Technical Education (CTE) Committee (2023), pp. 9.

[12] Most districts addressed CTE expansion in their March 2024 Blueprint implementation plans but did not provide systematic information about their current or anticipated CTE offerings.

[13] Dougherty (2016).

[14] Witzen, B. H. (2018). *The effects of completing a health CTE program on college and workforce outcomes.* Maryland Longitudinal Data System Center.

[15] Witzen (2019).

[16] Muro, M. & Liu, S. (2023, February 7). As the digitalization of work expands, place-based solutions can bridge the gaps. *Brookings.* U. S. Bureau of Labor Statistics (2023). *Occupational outlook handbook.*

[17] Ashcraft, C., McLain, B., & Eger, E. (2016). *Women in tech: The facts.* National Center for Women & Information Technology. Code.org (2022). *Computer science access report data.* Liu, J., Conrad, C., & Blazar, D. (2024). Computer science for all? The impact of high school computer science courses on college majors and earnings. IZA Discussion Paper No. 16758.

[18] Career and Technical Education (CTE) Committee (2023).

[19] Advance CTE (2023). *The state of Career and Technical Education: An analysis of state secondary CTE funding models.*

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