PIONEER
EDUCATION

Expanding Access to Career Vocational Technical Education

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INSTITUTE

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Executive Summary

Massachusetts offers a variety of highly regarded career education programs to more than 80,000 high school students. The largest and most rigorous, which is offered at regional vocational schools as well at comprehensive local schools, provides almost 1,000 hours of training and prepares students to immediately enter the workforce.

This program, known as Chapter 74, serves 55,000 students or roughly one fifth of high school students across the state. Opportunities for career education are not distributed equally across the state, as the share of high school students in career/technical programs ranges from zero in Nantucket and 7 percent in Suffolk County to 40 percent in Bristol County.

Despite spending half their time on career education, students at these schools perform just as well on the MCAS and other measures of achievement as students in traditional high schools. Not surprisingly, students at these schools are more likely than their peers to move straight into the labor force after graduation, although there are also many who plan to attend college. Students from regional career/technical schools go on to earn higher income during the 10 years after high school than their peers, although the data do not allow a clear analysis of whether the schools cause higher income.

Career/vocational education is popular among students and their families, and enrollment has grown by 20 percent over the past decade. This is particularly notable because overall high school enrollment has been flat during this time, and many traditional high schools face enrollment declines. The growth understates the demand among students and their families—many career/technical programs are oversubscribed and cannot accept all the students who wish to go; in 2023–24, career/technical programs with 10,000 seats received more than 20,000 applications. The shortage of seats has been growing, and it is particularly large in Gateway cities, where half of applicants are turned away.

The positive student outcomes and unmet demand for seats indicate that the state has the opportunity to expand access to career/vocational education programs. The 2026 budget includes $100 million in grants to provide an additional 3,000 seats, which would eliminate more than a third of the current shortage. This would be an excellent start, but the state can and should do more.

Introduction

Massachusetts has a career education system, also known as career vocational/technical education or CVTE, that is widely considered one of the best in the country. CVTE programs provide students with valuable skills, and provide employers with a pipeline of skilled employees. The value of career /technical education is also recognized by students and their families, and the demand for seats in CVTE programs often exceeds capacity. For many years, advocates have praised CVTE and called for expanding access to the system.[1]

High school students in Massachusetts have multiple options for CVTE, which the Department of Elementary and Secondary Education (DESE) separates into “Pathways.”[2]

- **Career Technical Education**—Commonly known as Chapter 74 or C74 programs because they are governed by Chapter 74 of Massachusetts General Laws, which regulates vocational education programs. Students receive at least 900 hours of career coursework and work-based experience, and they earn credentials meant to prepare them for immediate entry into a career upon graduation.
- **Career Connections**—Students take two or three courses focusing on one industry, as well as a work-based learning experience.[3] Career connections programs may also

be known as N74 or Perkins programs because they are not Chapter 74 programs but are funded through federal Perkins grants.

- **Innovation Career Pathways**—Students take at least two courses related to continued study in an industry area, as well as at least 100 hours in an internship or work-based learning (WBL) experience. Programs focus on specific high-demand industries such as information technology, engineering, healthcare, life sciences and advanced manufacturing but do not fall under Chapter 74 or the Perkins grants.
- **Early College**—students take 12 or more credits of college general education courses.

While DESE views career education across a continuum that offers students alternatives, the programs are quite distinctive. Early college programs benefit students, but they provide no practical job training that most people associate with "career" education. The other pathways all provide job-specific training, but at different levels. The Chapter 74 programs, which are probably what the public might think of when they think of career education or "voc/tech" schools, are significantly more rigorous than the other options. Students devote roughly half their time in school to traditional academic courses and half their time to career training—900 hours of work is the equivalent of six months of full-time experience.[4] This compares to only two or three courses in the career connections or innovation pathways, which can include AP or dual enrollment courses that are at best marginally related to concrete career skills.

The different levels of rigor are reflected in the desired program outcomes. The main goal of the early college pathway is to earn college credit and help students make faster progress towards an eventual degree—certainly laudable, but not immediately applicable to a specific job. Both the innovation pathways and career connections pathways are meant to allow students to "explore" and "gain experience" in an industry, and to develop a post-graduation plan. This may be helpful, but students will likely require additional training or experience to perform most jobs.

In contrast, in Chapter 74 programs students are meant to earn "high value industry recognized credentials that prepare them for immediate entry into careers upon graduation…" Students begin in an exploratory program in 9th grade to learn about the potential career training available to them, then choose a specific program to pursue for their remaining three years to build skills.

This paper provides background information about vocational education in Massachusetts, with a focus on the Career Technical Education pathway or Chapter 74 programs. It describes Chapter 74 schools, programs, and students, discusses the way the schools are financed, and explores the opportunities for expanding capacity to allow more students to participate.

How CVTE is Organized

Overview of Programs, Schools, and Students

Students following the career connections, early college, and innovation pathways generally take most of their classes at their regular high school, perhaps supplemented with job-based learning experiences or classes at a local college.

The C74 programs provide training across 11 career clusters in 44 program areas such as automotive repair, plumbing, dental assisting, robotics, and more.[5] CVTE programs generally involve a significant amount of work-based learning as well as cooperative education, where students are paid by employers while continuing to learn and build their skills.

As Table 1 shows, just over 55,700 students enrolled in C74 programs statewide in 2023–24, which is roughly 20 percent of all Massachusetts high school students.[6, 7] An

additional 10,000 students enrolled in N74 programs, 8,200 were in early college, and 7,000 were in innovation pathways. In total, more than one out of four students takes part in CVTE.

Table 1—Enrollment in CVTE Pathways, 2023–24

Pathway	Enrollment	% of High School Enrollment	% of CVTE Enrollment
Chapter 74	55,728	19.2%	69%
N74	10,042	3.5%	12%
Innovation Pathway	6,955	2.4%	9%
Early College	8,241	2.8%	10%
Total CVTE	80,966	27.9%	100%

CVTE enrollment, and especially C74 enrollment, has grown both in recent years and over the past decade or more. In the past two years, enrollment in C74 programs grew by 1,400 students or 2.6 percent, while since 2011–12 it has grown by 11,000 students or 24 percent. In contrast, N74 enrollment has fallen from almost 13,000 in 2011–12, although it has grown in recent years.

The 24 percent growth in C74 programs is notable because it took place against a background of flat overall enrollment, and it clearly indicates that students and families want in-depth CVTE education. As will be discussed later, the demand for seats at C74 schools often outpaces supply, leading to a long waitlist at some schools.

CVTE programs are not evenly distributed around the state. Table 2 shows the share of students in C74 programs by county (based on where school offering the Chapter 74 program is located), and it ranges from 0 on Nantucket to over 40 percent in Bristol County.[8]

Table 2—CVTE Enrollment and Enrollment Growth by County, 2023–24

County	C74 Enrollment	% of Total Enrollment	C74 Enrollment Growth Since 2011–12	High School Enrollment Growth Since 2011–12
Barnstable	1,759	22.9%	33.9%	–5.8%
Berkshire	1,256	27.7%	14.5%	–19.0%
Bristol	10,712	40.8%	20.9%	5.3%
Dukes	268	34.5%	71.8%	9.3%
Essex	7,438	21.3%	45.2%	5.0%
Franklin	621	27.9%	21.5%	–25.1%
Hampden	3,797	18.0%	3.3%	–5.8%
Hampshire	709	13.9%	26.8%	–15.0%
Middlesex	12,695	18.8%	31.7%	4.0%
Nantucket	0	0.0%	—	49.9%
Norfolk	4,203	14.2%	5.4%	–0.3%
Plymouth	3,024	13.1%	57.3%	–7.3%
Suffolk	1,731	7.3%	46.2%	6.1%
Worcester	7,483	19.8%	11.2%	–1.8%
State Totals	**55,696**	**19.4%**	**24.4%**	**0.3%**

Perhaps the most striking figure in the table is that only 7 percent of students in Suffolk County enroll in Chapter 74 programs—one third of the share of students outside Suffolk and less than one fifth the figure in Bristol County. This begs the question of why so few Boston-area students participate in CVTE programs, and two simple explanations suggest themselves. One would be that students in Suffolk County do not desire CVTE, perhaps because students in the Boston area have a much larger selection of charter schools to serve families dissatisfied with local school options. However, most charter schools do not provide CVTE, and it strains credibility that students in Suffolk would differ so dramatically from students elsewhere. An alternative explanation is that Suffolk County students do not have as many high-quality CVTE options.

The table also shows growth in C74 enrollment since 2011–12. Enrollment in Chapter 74 programs grew 24 percent statewide and increased almost everywhere, even in counties with falling total enrollment such as Berkshire, Franklin, and Hampshire. Chapter 74 enrollment grew especially quickly in Dukes, Essex, and Plymouth counties. Enrollment in Suffolk also grew rapidly, but it started at such a low level that total enrollment still lags well behind other counties.

As mentioned earlier, students have choices between dozens of program areas across 11 career clusters and DESE regularly adjusts the programs to match labor market needs. DESE currently identifies aviation maintenance as an area with emerging demand for workers, while several program areas have declining demand: cabinetmaking, stationary engineering, fashion technology, sheet metalworking, power equipment technology, and painting and design technologies. The most popular programs have stayed the same in the years since 2011–12, as shown in Table 2.

Table 3—Five Largest Chapter 74 Programs, 2023–24 and 2011–12

	2023–24
Health Assisting	3,144
Culinary Arts	2,880
Electricity	2,599
Carpentry	2,577
Automotive Technology	2,479

	2011–12
Culinary Arts	3,043
Health Assisting	2,745
Automotive Technology	2,346
Carpentry	2,129
Electricity	2,016

Chapter 74 Schools

One hundred eleven schools across Massachusetts offer students C74 programs. Most students attend separate CVTE schools—primarily the regional vocational and agricultural schools—where every student participates in CVTE. Other students attend comprehensive schools where the career program is embedded within a traditional high school and only some students at the school enroll in the state-approved CVTE programs. Finally, a small number of students take C74 programs at charter schools.

Of the 111 schools, 67 are comprehensive schools in local school districts, 12 are comprehensive schools in regional school districts, three are charter schools, and 29 are regional vocational or agricultural schools. While there are more comprehensive schools, the regional voc/tech schools enroll more students in Chapter 74 programs and serve 56 percent of all C74 students.

Table 4—Chapter 74 School Types and Enrollment, 2023–24

School Type	Schools	Enrollment	% of Total
In Local District	67	22,153	39.8%
In Regional District	12	1,837	3.3%
Charter School	3	319	0.6%
Regional Vocational Technical / Agricultural	29	31,387	56.4%
Total	111	55,696	100%

As mentioned earlier, despite flat high school enrollment in Massachusetts, enrollment in C74 programs has grown by 24 percent since 2011–12. Enrollment grew at all types of schools, but the majority of the growth—about two thirds of the total—took place in comprehensive schools. Enrollment at these schools increased by more than twice as many students as enrollment at the regional voc/tech and agricultural schools.

Funding Career/Technical Education

CVTE schools receive funding from the state and from municipalities. For CVTE schools within a regular district the funding is very similar to that at any other school, while for regional vocational technical schools, the local funding comes primarily from member municipalities according to the regional agreement, as well as additional funding in the form of tuition for any students from non-member districts.

The regional agreements can make it more difficult to approve capital projects such as construction of a new school because every member district must vote to approve the project. Some officials have stated that the regional agreements can apportion the costs in ways that create conflict if member municipalities feel that they are being charged more than their fair share.

The state provides funds for C74 programs in several ways: through the Massachusetts School Building Authority (MSBA) for the construction of new schools; through the Chapter 70 program for operating costs; and through grants for specific purposes.

While grants are relatively straightforward, both MSBA and Chapter 70 have shortcomings. The MSBA provides reimbursement for a share of construction costs, but does not account for the fact that CVTE schools are more expensive to build than regular high schools. From fall of 2013 to fall of 2024, MSBA approved new construction on 23 regular high schools and seven vocational technical high schools. The schools range in projected cost from $60 million to $300 million, and in capacity from 460 students to over 1,800. Construction costs are difficult to compare because they depend on the project's location and the year, but a simple proxy for cost is to look at the size per student. The traditional schools average 240 square feet per student, while the vocational technical schools average about 300, a difference of 25 percent.[9] Advocates for career education argue that the MSBA should provide a higher reimbursement rate to offset the higher construction cost.

The Chapter 70 formula can also lead to potential inequities and misunderstandings. The formula recognizes that vocational/technical education is more expensive to provide, and it therefore increases the foundation budget by approximately $5,000 per student. There are two problems with this approach. The first is that the increment may not accurately represent the additional cost of vocational schools.[10] If it misstates the cost, municipalities might rightfully feel that CVTE is a financial burden.

The second problem is more subtle and involves the question of how to share the additional cost of CVTE between the state and the local city or town. In other words, even if

the $5,000 figure is accurate, it is not clear who should pay it. The foundation budget is meant to measure the cost of providing an education, and it does not translate directly into additional state aid. A municipality's state aid depends in part on the foundation budget, but also on local ability to pay as measured by income and property values. Two cities sending a student to a vocational/technical program could receive quite different amounts of state aid, which means the local share of the cost is also quite different.

The rationale that wealthier municipalities should pay a higher portion of the cost of educating local students is reasonable. However, the formula does not directly calculate the dollar amount a town must spend—instead it calculates the percentage of total spending. This means that if two identical towns send a different number of students to vocational schools, the town with more CVTE students would have higher required local spending. The average municipality is responsible for roughly 40 percent of the foundation budget, which means that an average town's required local contribution increases by roughly $2,000 when a student attends a vocational school. It is not clear whether this is fair—i.e. should identical towns be required to spend the same *dollar amount*, or should they pay the same *percentage of the cost*? If one believes that identical towns should pay the same dollar amount, then the state would have to pick up the additional cost of CVTE.

Tension Between CVTE and Traditional Schools

The structure and funding of CVTE can create conflict between traditional schools and CVTE because CVTE programs essentially compete with traditional high schools for students. Some local officials probably view the CVTE programs as taking money out of the local school system. The result is that some regional vocational technical schools have argued that local officials have been reluctant to allow the schools to recruit students.

This structure creates a potentially more serious problem at comprehensive schools (those within a regular local district), where the local school committee controls funding, management of the CVTE programs, and recruitment. If local officials view a comprehensive school as a drain on traditional schools, they not only have the ability to restrict recruitment, but also directly to reduce funding to CVTE programs or refuse to provide programs that attract students. This may be why CVTE advocates argue that some local districts neglect their comprehensive high schools. This is in contrast to regional CVTE schools, where school managers have incentive to provide the highest quality and most popular programs (regardless of any problems recruiting students).

Chapter 74 Student Demographics and Outcomes

Who are the 56,000 students who participate in Chapter 74 programs? They might be different than students at traditional high schools for three reasons. One is that students must choose to participate in the programs, which indicates they might be different than students who choose not to participate. Another is that CVTE schools are not spread evenly throughout the state and may draw more heavily from communities with demographics that differ from the state average. Finally, Chapter 74 programs have often restricted eligibility based in part on a student's attendance record and disciplinary history—students with significant disciplinary problems or poor attendance were less likely to be accepted.[11]

Despite these factors, demographic data indicate that students in Chapter 74 programs are quite similar to students across the Commonwealth.[12] The only substantial difference is that there are fewer than half as many students classified as English language learners (ELL) in CVTE programs.[13] This gap may be due to the geographic distribution of CVTE enrollment discussed above, including the lack of students from Suffolk County.

Table 5—Chapter 74 Student Demographics[14]

Category	Chapter 74 Programs	Statewide Averages
Black	9%	10%
Hispanic	26%	25%
White	57%	53%
Female	46%	48%
Low-income	46%	42%
English Language Learner	6%	14%

Many years ago, CVTE programs had a reputation for providing weaker academic training than traditional schools. However, the implementation of MCAS led CVTE schools to place renewed emphasis on academic preparation in addition to career or vocational training.[15] This focus produced impressive results, as CVTE students now demonstrate strong achievement, whether measured by MCAS scores, graduation rates, or college attendance. For example, despite spending large amounts of time in career education, students at regional career/technical schools scored roughly at state averages on the MCAS exams (Table 6). The regional CVTE schools also have an impressively low dropout rate that is well below the state average.

Table 6—10th Grade MCAS Results (2023–24), Dropout Rate (2022–23)

Indicator[16]	Regional Career/Technical Schools	Statewide Average
10th Grade MCAS ELA	58.4%	56.9%
10th Grade MCAS Math	45.6%	48.5%
Dropout Rate	0.4%	2.1%

Chapter 74 students certainly perform well, but one has to be careful not to draw unsupported conclusions from simple comparisons. As stated earlier, students choose to attend CVTE programs and the programs are selective about who is accepted. These facts not only affect the makeup of the student body, but also make it difficult to determine the extent to which the schools are responsible for impressive student outcomes. For example, when a high school only accepts students who had strong attendance in middle school, it should not be surprising if the students also have strong attendance in high school. The problem this presents when evaluating the impact of attending CVTE schools is known as selection bias.

There has been research into the impact of CVTE in Massachusetts on student outcomes that adjusts for selection bias.[17] The research studied Massachusetts students graduating from high school from 2008 to 2015 and found that attending a vocational school raised the probability of graduation by 7 to 10 percentage points. The study did not evaluate earnings, but a higher graduation rate would almost certainly lead to higher wages later in life. The analysis also suggested that the impact may have been larger for low-income students and students who were less likely to satisfy the admission requirements— i.e. that CVTE schools were more effective for at-risk students. These findings are important, but the study had some limitations: parts of the study were restricted to students at three CVTE schools, and data limitations made it difficult for the author to evaluate the impact on different groups of students or different career programs.

While Chapter 74 students have broadly similar demographics and achievement levels as students in traditional high schools, they have significantly different plans after graduation. Not surprisingly, more than twice as many students from regional CVTE schools

plan to go straight into work or an apprenticeship. At the same time, while a large share also plan to attend college, the share is substantially lower than for other students around the state.

Table 7—Plans After High School, 2023–24 [18]

	Regional Career/Technical Schools	Statewide Average
Work or Apprenticeship	34.9%	15.0%
4-Year Private College	16.2%	28.1%
4-Year Public College	23.9%	30.5%
2-Year College	14.6%	13.4%
Any College	54.7%	72.0%

CVTE students, or at least those at regional career/technical schools, say they are both more likely to start work immediately and less likely to attend a public college. This is hardly surprising, as some students choose CVTE because they want to start work or do not want to attend college. These choices have implications for the state government budget: working graduates pay taxes immediately, and fewer students in public colleges reduces the need for state subsidies to higher education.

DESE also provides information about employment and wages for graduates of different high schools. These data allow an evaluation of whether students follow through on their plans, and a comparison of students who went to a regional career technical school to their peers.

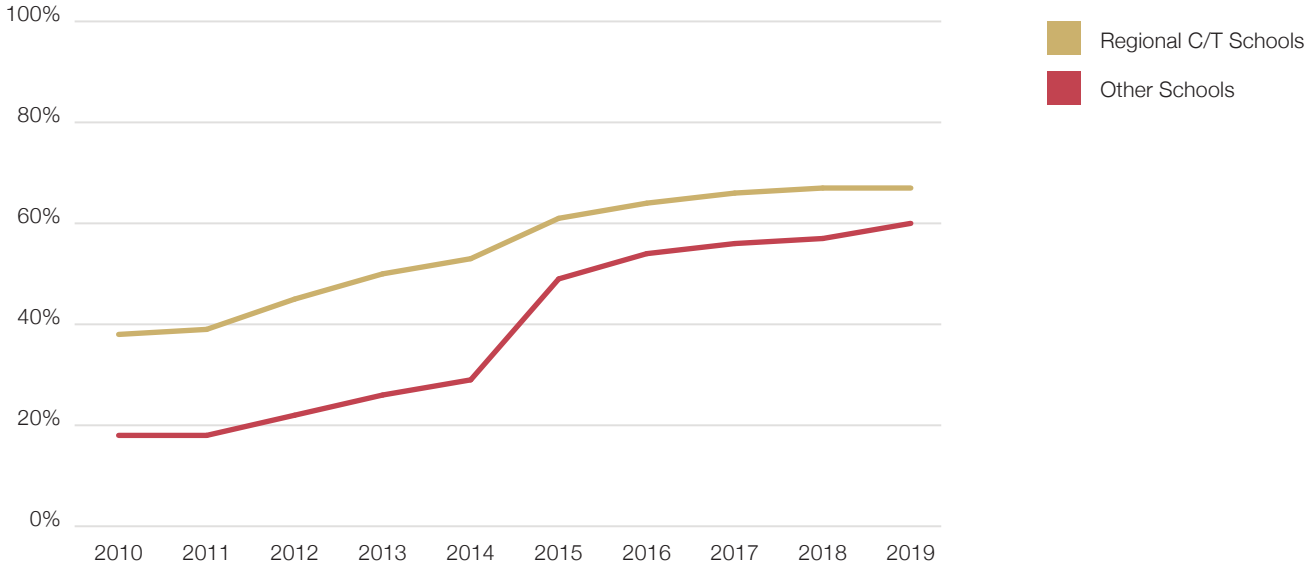
As stated earlier, data for CVTE programs suffers from selection bias, both because students who wish to attend CVTE programs may differ from those who do not, and because many CVTE schools restrict entry. Additionally, the labor market data lose track of many graduates, which could distort the results. These issues mean that differences in outcomes must be interpreted carefully, and they should not be interpreted as clear evidence that schools cause the differences in employment and wages.

DESE possesses detailed data that would allow a more complete evaluation of the academic and career impact of attending a Chapter 74 program. Researchers could use statistical techniques to minimize the impact of selection bias by comparing students who are relatively similar, except that they attend different schools. This would allow a clearer evaluation of the extent to which CVTE programs affect academic outcomes and wages. Better data could also permit the evaluation of individual CVTE school and different career clusters and program areas—for example to compare outcomes for students in culinary arts vs. students in carpentry. DESE has the detailed data necessary for these analyses, but they are not publicly available due to concerns about student privacy.

With the caveats in mind, one can compare employment and earnings for students from regional career/technical schools to state averages. Figure 1 and Figure 2 track students who graduated in 2010, comparing the experience of graduates from the regional career/technical or agricultural schools with students graduating from other schools.[19]

Unfortunately, the outcomes for students in Chapter 74 programs at comprehensive schools cannot be separated out from their host district. Roughly 60 percent of CVTE students attend regional schools, but the remaining 40 percent are included with the "other" schools. This suggests that the graphs probably understate the differences between vocational schools and traditional schools. It would be interesting to know if students from the comprehensive schools experience similar labor market outcomes as students from regional CVTE schools, but the published data do not allow an answer to this question.

Figure 1—% of 2010 Graduates Employed

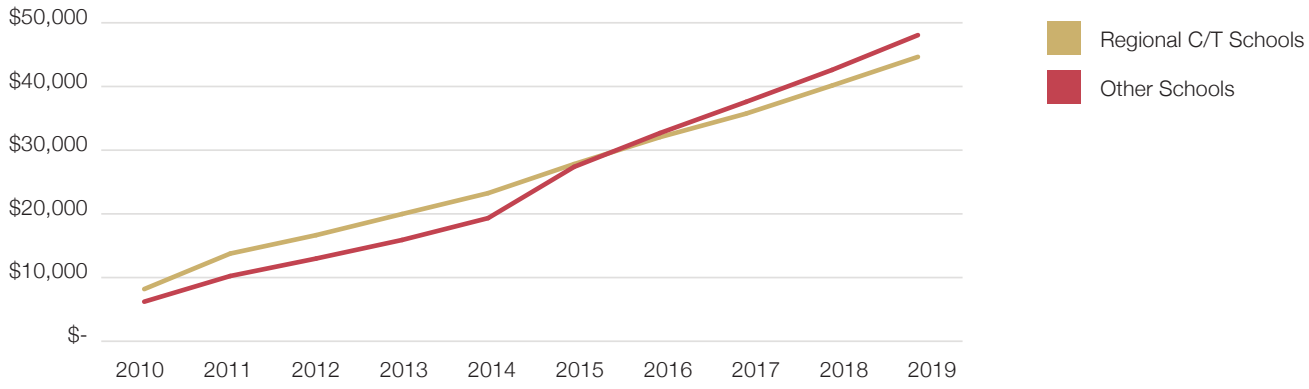


In the years just after graduation, graduates from regional career technical schools are much more likely to be employed than their counterparts from other high schools. This reflects the students' plans that were discussed earlier, as more CVTE students plan to immediately join the labor force.

The large gap in employment persists until 2015, five years after graduation, when many students from the high school class of 2010 would graduate from college. While the employment gap closes in the following years, CVTE students continue to be more likely than students from other schools to be employed throughout the decade after their graduation. By 2019, 67 percent of graduates from regional career/technical schools were employed compared to 59 percent of graduates from other schools.[20]

Figure 2 compares average wages for students from the class of 2010. In years immediately after graduation, when many students are not working and many others probably only work part time, average wages are quite low. During the first few years after high school, graduates from the regional career/technical schools consistently earn more than their peers. As more students join the labor force and existing workers work more hours and gain experience, wages rise quickly for both groups. The CVTE graduates maintain higher earnings until five years after graduation, when substantial numbers of college graduates join the sample. However, even after that point, salaries for CVTE graduates are relatively similar to statewide averages.

Figure 2—Average Earnings by Year, 2010 Graduates



The combination of a substantially higher likelihood of working and similar wages means that in total, graduates from career/technical schools earn substantially more than their peers during their first decade out of high school. The results are more notable because higher-income students in Massachusetts are less likely to attend CVTE programs and more likely to earn high incomes, which should put the CVTE students at a disadvantage. In total, the economic benefit for students is also larger than the gap in wages or employment indicate, because CVTE students do not spend as much on college tuition.

Excess Demand for Chapter 74

Many students clearly have a desire to enroll in Chapter 74 programs; at many schools, the demand for space exceeds the number of seats available. The shortage is not new – in 2019 DESE released a report that found "clear evidence that the demand for Chapter 74 programs exceeds the available supply across the Commonwealth" and that the shortage appeared to be growing over time.[21]

The DESE report showed a shortage of roughly 6,000 seats in 2017, but we can evaluate more recent data. For 2024, DESE reported on 33 schools with more applicants than seats available (listed in Appendix 1). There are different ways to measure the shortage. The simplest measure would compare the number of seats available to the number of applicants. However, some students who apply choose not to attend even if they are accepted, which effectively opens up seats for other students. In part for this reason, schools generally accept more students than they eventually enroll. A more accurate measure can compare the number of students who apply to the number who are accepted.

Figure 3—Applications and Seat Shortages, 2021–2024

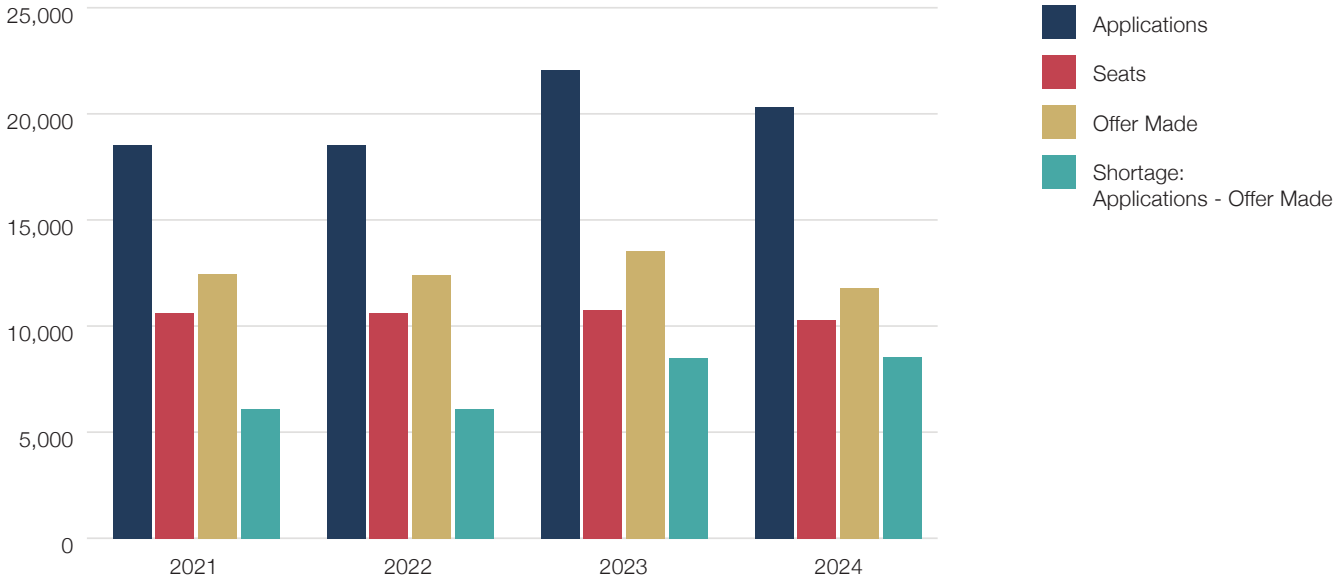


Figure 3 shows the number of applications and acceptances at schools that are oversubscribed—it does not include schools where there is no shortage. In recent years at these schools, more than 20,000 students apply for about 10,000 seats. Ultimately, roughly 8,500 students are not accepted, meaning that 40 percent of eligible students are turned away.

DESE provides data on applications and enrollment for some student subgroups at these oversubscribed schools, such as race and income. Black students submitted

43.9 percent of completed applications to these schools and make up 43 percent of enrolled students, which indicates that they are not disproportionately affected by the shortage. Low-income students seem to enroll at slightly lower rates—they submitted 47.6 percent of the completed applications and eventually comprised 44.4 percent of enrollees. The most striking figures in the DESE data are the low number of English language learners (ELL) who apply and attend, which was already evident from the total demographic data presented in Table 5. ELL students make up only 8.3 percent of the eligible applicants, 7.2 percent of completed applications, and 7 percent of enrollment at these schools.

The largest unmet need, both in terms of the number of seats and the percentage of district enrollment, are in Bristol and Essex Counties. The shortages are particularly large in Gateway cities, where DESE reports that almost half of all applicants are turned away. Some individual schools have an even larger shortage, as seen in Table 9.

Table 8—Shortages by County, 2024

County	Schools with Shortage	Applicants	Seats
Barnstable	2	711	413
Berkshire	1	163	125
Bristol	5	4,284	1,886
Essex	4	4,095	1,622
Hampden	3	1,036	680
Hampshire	1	307	150
Middlesex	6	4,130	1,845
Norfolk	3	1,266	645
Plymouth	3	984	316
Worcester	4	3,239	1,400

Table 9—Schools with Largest Shortages, 2024

School	Applicants	Seats	Offers	Shortage	% Shortage
Southeastern Regional	1169	410	509	660	56%
Essex North Shore	1486	477	655	831	56%
Bristol County Agricultural High	555	170	249	306	55%
Blackstone Valley	810	320	371	439	54%
Norfolk County Agricultural	429	155	202	227	53%
Northeast Metro Regional	1031	360	505	526	51%
Worcester Technical High	940	400	466	474	50%
Montachusett Regional	842	365	419	423	50%

The shortage has gotten larger in the last few years as more students apply while the number of seats has stayed roughly the same; in 2023 a large increase in applications meant the shortage jumped from 6,100 to over 8,500. Unfortunately, DESE declined to provide detailed data for earlier years that would allow an analysis of how demand and enrollment have changed over time, and the extent to which new seats were opened in areas with unmet need.

While the DESE figures clearly indicate shortages at many schools, the figures are somewhat misleading and may substantially underestimate the true scope of the problem. This occurs because demand is affected by the quality and types of programs offered—schools with a good reputation and popular offerings attract students. In other words, when more high-quality options are available in an area, more students apply. This can be seen in Bristol, which has both the largest share of students in CVTE programs and also a substantial shortage of seats.

The reason this creates a problem with the data on the seat shortage can be seen in Suffolk County, where students are only one third as likely to participate in CVTE programs. This means that no shortage appears in the DESE data, but it is difficult to believe that the low number reflects a lack of desire on the part of students to participate in Chapter 74 programs. It seems more likely that it reflects a lack of opportunity. If students in Suffolk have the same preferences as students elsewhere but do not have good CVTE options available, the system would need an additional 3,000 seats to meet their needs.

Conclusion

There are several ways that the state could improve the CVTE system. First, DESE has the data necessary to comprehensively evaluate the impact of CVTE on students. DESE manages CVTE programs to ensure that offerings match the needs of the labor market. While this is laudable, it ignores a simple measure of whether CVTE programs are effective—how they affect student success.

DESE should use the detailed student-level data to evaluate how CVTE programs affect academic achievement as well as wages and the probability of employment. Rigorous analysis could also explore the effectiveness of different program areas and career clusters, and perhaps whether outcomes are similar for students at regional and comprehensive schools. This analysis would cost the state nothing; if DESE does not have the staff resources to perform the analysis, it could provide the data to academic researchers who would welcome the opportunity to analyze it.

The state should also investigate why students in some areas attend CVTE at much lower rates. Providing additional seats in Bristol would help students attend oversubscribed programs there, but it also exacerbates the enrollment gap across the state. If the differences in attendance are driven by a lack of opportunity rather than a lack of interest, which seems likely, it indicates that the current CVTE system does not provide desirable and equitable options; students in greater Boston appear to be deprived of opportunities available to other students. This could be because the nearby CVTE options are unappealing to students, or because local officials deter students from attending CVTE programs. Either problem may be difficult to solve, but identifying the issue is an important first step in addressing inequity.

Beyond analyzing enrollment and outcomes, the state should move to expand access to career/technical education to address the shortage in seats. The primary immediate constraint on CVTE appears to be the number of seats available, which means that expansion requires creating additional facilities and purchasing new equipment.

Each school or system that is at capacity may have different needs, and state government has several financial levers that could be used to support expansion. In some areas, there may be no way to expand enrollment without substantial new construction, but in others there may be less costly opportunities and smaller grants might be sufficient to update or renovate existing space or equipment.

The 2026 budget includes $100 million in grants to expand career/technical education.

The governor's original proposal of $75 million was meant to provide an additional 3,000 seats, which implies a cost of $25,000 per additional seat. One hundred million dollars is a substantial figure, but it is important to recognize that the additional capacity will accommodate students for many years. It is impossible to know how many students will benefit from the expanded capacity before the space becomes obsolete or needs renovation, but the cost *per student served* each year is substantially lower than the topline number might suggest. Adding 3,000 seats will also lead to additional state aid in the Chapter 70 program. The details depend on where the students live, but the ongoing cost to the state will likely be in the neighborhood of $9 million each year, or $3,000 per student.

If fully implemented and successful, the grants would eliminate about a third of the current shortage of 8,100 seats. However, given recent growth in the number of applications and changes to the application process, demand might continue to increase and put additional pressure on capacity.

Because the grants focus on creating new seats and can be directed where the funds will be most immediately useful or the shortage is greatest, they are the fastest and most direct way to expand access. These grants are an excellent start. However, they may not benefit students in areas such as Suffolk County that don't have documented shortages; helping these underserved students would require identifying the barriers that currently prevent them from enrolling.

The state can do more than provide expansion grants. One option would be to revisit the MSBA reimbursement system for new CVTE schools. Creating seats for larger numbers of additional students as well as replacing older CVTE schools over time will require new construction. CVTE schools cost more to build than traditional schools, yet the state pays the same share of the cost. The state could certainly ease the financial burden of new construction by increasing the reimbursement rate.

The state could also revise the Chapter 70 formula to cover a larger share of the cost of vocational schools. The simplest way to do this would be to evaluate whether the $5,000 increment for vocational schools should be raised. An increase would provide additional aid to many cities and towns, and could partially defuse the claims by local officials that the system understates the cost of vocational education or that vocational students are a burden on the local school district.[22] An alternative would be to change the Chapter 70 allocation mechanism so required local spending does not increase if a student attends a vocational school. This would indirectly lead to additional state aid.

Both these alternatives may be unadvisable. One problem is that amending the Chapter 70 formula is a highly contentious process. A change to the $5,000 figure would be straightforward and could be contained in simple legislation, but a change to the allocation mechanism would be more complex and might open up a messy debate over the entire formula. A second problem with changing the allocation mechanism is that it lacks clarity; because of the complexity of the Chapter 70 formula, municipal officials may not understand how the change affects their required spending and state aid. If the purpose of the adjustment is to provide additional financial aid and reduce local opposition to CVTE, this change may fail.

Of the three options to provide more funding—grants, through MSBA, or a change to the chapter 70 formula—grants are by far the simplest, most direct, and likely to have the quickest impact. They will provide thousands of additional students with an opportunity to succeed and help ensure that businesses can find qualified employees. The state recently began requesting grant proposals, the program should be monitored and if successful it should be expanded in future years to address continued shortages.

While expanding access can be costly, it is not appropriate to view the costs in a vacuum. The Commonwealth spends $2 billion per year on higher education. This expenditure is rightly viewed as an investment in students and in the Commonwealth's economy, and spending on career-technical education should be viewed the same way. Higher education costs the state more than $15,000 per student per year, significantly more than the incremental cost of CVTE compared to a regular high school. Moreover, CVTE serves more low-income and minority students than colleges and universities and expanding access would improve equity by helping students who are less likely to benefit from spending on higher education.

Spending on CVTE will also generate a return. To the extent that CVTE graduates join the labor force immediately, they begin contributing to the state's economy and paying taxes more quickly than they would otherwise. Also, while many CVTE graduates go on to college, not every student needs post-secondary education. For each student who finds a good job without attending a public college, it reduces the need for additional subsidies to higher education and offsets some of the cost of CVTE programs.[23]

Career vocational-technical education in Massachusetts has been very successful. That success shows up in the number of students interested in CVTE programs and in businesses' desire to hire graduates. Expanding the system would benefit thousands of students at a relatively modest cost while helping to ensure that the Commonwealth's economy has the skilled workers it will need.

Appendix 1—Seat Shortages by School, 2024

	Applications	Seats
Statewide Total	**20,330**	**10,305**
Assabet Valley Vocational High School	468	300
Bay Path Regional Vocational Technical	647	315
Blackstone Valley	810	320
Blue Hills Regional Vocational Technical	420	240
Bristol County Agricultural High School	555	170
Bristol-Plymouth Vocational Technical	724	356
Cape Cod Regional Vocational Technical	360	183
Charles McCann Vocational Technical	163	125
Diman Regional Vocational Technical	728	385
Essex North Shore Agricultural and Technical	1486	477
Greater Lawrence Regional Vocational Technical	1333	485
Greater Lowell Regional Vocational Technical	1398	580
Greater New Bedford Vocational Technical	1108	565
Joseph P Keefe Technical High School	467	225
Lynn Vocational Technical Institute	554	300
Minuteman	378	180
Montachusett Regional Vocational Technical	842	365
Nashoba Valley Technical High School	388	200
Norfolk County Agricultural	429	155
Northeast Metro Regional Vocational	1031	360
Old Colony Regional Vocational Technical	268	141
Pathfinder	296	180
Plymouth	430	NA[24]
Roger L Putnam Vocational Technical Academy	513	350
Smith Vocational and Agricultural High	307	150
South Shore Vocational Technical High	286	175
Southeastern Regional Vocational Technical	1169	410
Tri-County Regional Vocational Technical	417	250
Upper Cape Cod Vocational Technical	351	230
Westfield Technical Academy	227	150
Whittier Regional Vocational	722	360
Worcester Technical High	940	400

NOTE: If a school has 100 applicants for 60 seats, the initial shortage would be 40 seats. However, some students would choose not to go, which frees up more spaces. The eventual shortage depends on how many students are unable to enroll.

Endnotes

1 For example, see "The Critical Importance of Vocational Education in the Commonwealth" by Tumber et al, Northeastern University, 2016; and "Hands on Achievement: Massachusetts' National Model Vocational-Technical Schools" edited by Chris Sinacola and David Ferreira, Pioneer Institute, 2022.

2 For more information, visit https://www.doe.mass.edu/ccte/pathways/default.html

3 Programs in the following fields require Chapter 74 approval and cannot be offered as Career Connections programs: Aviation Technology, Electricity, HVAC, Plumbing, Cosmetology, Veterinary Science, Animal Science, and Early Education and Care. https://www.doe.mass.edu/ccte/pathways/n74/default.html

4 For a description of how C74 programs are organized and how students choose their career cluster and program, see https://www.doe.mass.edu/ccte/pathways/cte/default.html

5 For a full list of career clusters and programs, see https://www.doe.mass.edu/ccte/pathways/cte/default.html. NOTE: While DESE states that there are 44 program areas, enrollment data for 2021–2022 shows enrollment for only 35 areas. It is not clear why some areas have zero enrollment reported.

6 This paper uses the most recent data found on the DESE website. However, data on different topics is available for different years, so that the dates will not be consistent throughout the paper.

7 This includes about 300 students in the "after dark" program.

8 The county figures are based on the location of each school rather than the home district of the student. For example, the largest group of students at Tri-County Regional Vocational Technical High School, which is in Norfolk County, come from North Attleboro in Bristol County. For this table they would be counted as students in Norfolk despite living in Bristol. The same is true for students attending charter schools, who are counted in the county where the school is located rather than their place of residence.

9 Data from https://www.massschoolbuildings.org/sites/default/files/edit-contentfiles/Programs/CP%20Data/Designer%26OPM/Designer_and_OPM_Fees_at_Schematic_Design_Current%20Data_High%20Schools.pdf

10 It would be problematic to adjust the foundation budget to reflect actual cost of CVTE schools because this could incentivize regional schools to increase tuition so that the local towns would receive additional state aid.

11 The admissions policy may change this year to a system based on a random lottery among applicants. For a description of admissions as well as tuition, see https://www.doe.mass.edu/ccte/policies/admissions/default.html#nonresident-tuition-rates

12 The statewide figures represent all K–12 students, while Chapter 74 students are all enrolled in 9th–12th grades.

13 The percentage of students listed as "first language not English" is also lower in Chapter 74 programs, at 20% compared to 27% statewide.

14 DESE has data that compares the demographics of C74 students to the sending districts, but they have declined to provide it.

15 For a discussion of the progress, see "A Hands-on Approach to Closing the Knowledge Gap" by Thomas Birmingham and William F. Weld, published in "Hands on Achievement: Massachusetts's National Model Vocational-Technical Schools" by the Pioneer Institute, 2022.

16 MCAS scores show the % of students meeting or exceeding expectations in 2023–24.

17 "The Effect of Career and Technical Education on Human Capital Accumulation: Causal Evidence from Massachusetts" by Shaun Daugherty, Education Finance and Policy, volume 13 issue 2, MIT Press Direct, 2018. Available at https://direct.mit.edu/edfp/article/13/2/119/10291/The-Effect-of-Career-and-Technical-Education-on

18 Data from https://profiles.doe.mass.edu/statereport/plansofhsgrads.aspx.

19 I chose 2010 to explore longer-term outcomes before the impact of Covid.

20 For comparison, the labor force participation rate for all adults in the United States, which includes both the employed and those looking for work, was 63% in 2019.

21 "Policy Brief: Understanding Excess Demand for High-quality Career and Technical Education in Massachusetts" accessed at https://www.doe.mass.edu/ccte/pathways/cte/programs/2019-07policy-brief.pdf#search=%22Understanding%20Excess%20Demand%20for%20High-quality%20Career%20Technical%22

22 In general, lower-income cities and towns would receive more additional aid from this change, although the details also depend on the level of enrollment, enrollment growth, and past levels of state aid.

23 The amount the state saves for each student who does not attend a public college depends on many factors, most importantly whether they would have attended a community college, a state university, or UMass, as well as how many years they would have spent in college. It also depends on the amount the student would have paid in tuition. The figure could plausibly range from a few thousand dollars to more than $100,000.

24 DESE data does not indicate the number of seats available, but 299 students received an offer.

About the author

Ken Ardon received a Ph.D. in Economics from the University of California at Santa Barbara in 1999, where he co-authored a book on school spending and student achievement. Dr. Ardon taught economics at Pomona College before moving to Massachusetts to work for the Commonwealth of Massachusetts in the Executive Office of Administration and Finance. He has served as a member of Pioneer Institute's Center for School Reform Advisory Board for two decades, and since 2004 has taught economics at Salem State University, where he served as chair of the economics department from 2014–2023. In 2024 he received a Fulbright Scholarship to teach the economics of education in Ankara, Turkey.

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