

Policy Brief:
**Understanding Excess Demand for High-quality Career and Technical
Education in Massachusetts**

Prepared for the Massachusetts Department of Elementary and Secondary Education

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Summary

Chapter 74 approved career vocational and technical education (CTE) programs in Massachusetts have received broad policy and educational support in recent years. Evidence of strong outcomes among students participating in these programs, and high demand for access to schools offering these programs have led policy makers to explore the extent to which more demand exists relative to the available supply of these programs. This brief begins to describe the volume of demand, relative to supply, and how imbalance in supply and demand is associated with particular features of schools or programs. It also contextualizes the admissions and recruitment process for applicants to Chapter 74 (Ch. 74) programs, a state-certified distinction with more stringent program requirements including the use of application processes to admit students (e.g. smaller class sizes – for more see <http://www.doe.mass.edu/cte/programs/>) as well as how students are matched to their permanent program once admitted.

Overall, we find:

- **Clear evidence that the demand for Chapter 74 programs exceeds the available supply across the Commonwealth.** Though not all schools report excess demand, the net difference demonstrates more desire for these programs than is currently being met. The fact that this imbalance is not equally distributed across the state suggests that some areas face particularly high demand, whereas others could accommodate more students if interest increased. Not only is overall demand higher than supply, among schools that reported data across a five-year period:
 - Excess demand seems to be increasing over time. The most populous workforce regions account for the vast majority of this excess demand, as do a handful of cities across the state, suggesting that policy solutions could be developed in more localized areas to address supply/demand imbalance. (See Tables 1 and 2)
 - Most schools report that building capacity is a leading factor constraining supply.
- **Program admissions policies are largely similar, though there are clear differences in the ability of schools to reach potentially interested students, as well as the methods schools rely on to reach those students.** Tours and open house activities in the evenings are the most common method of outreach. Approaches to reaching students differ based on school context (e.g. regional or comprehensive), as well as whether schools have oversubscribed programs. Some schools report difficulty reaching potential students, particularly regional schools. Overall, most schools' admissions processes take the same approach. Students submit applications and receive scores based on their middle school grades, attendance, discipline, counselor recommendation and in some cases interviews. Across these processes similar weights are used on application materials, with most elements getting close to equal weight, except sending school recommendation which receives little weight. Many schools report placing students on wait lists if they are not admitted initially. The majority of students placed on wait lists can be accounted for by schools with programs that are oversubscribed. In general, waitlisted students are those with complete applications that were scored, but where scores were lower than the last student offered admission.
- **Schools report that the vast majority of students in Chapter 74 exploratory programs are subsequently matched to their first or second choice of prioritized programs,** though the rate at regional technical schools was somewhat lower than others. Most schools report using some version of ranked choice as the mechanism for identifying program preferences, with some programs indicating that both students and educators each ranked relative program fit, which together informed program assignment. Program availability appears to be in relative alignment with the state employment landscape, though a few areas may be in under-supply relative to anticipated growth.

Table 1: Aggregate Supply and Demand for Chapter 74 Programs in Massachusetts, 2013-2017

Year	Number of Responding Schools ¹	Total Complete Applications	Total Complete Apps Minus Withdrawals (Est) ²	Total Seats Available	Enrolled Students by 10/1
2017	42	17,256	15,265	10,905	10,002
2016	35	14,826	13,185	9,161	8,676
2015	32	13,357	11,924	8,367	7,886
2014	27	11,494	9,825	7,476	7,116
2013	23	10,157	8,620	6,433	6,187

1. Responding schools must have (at minimum) filled in complete applications, seats available, and enrolled students for that year to be included in the year-specific total.

2. For oversubscribed schools, not all students were given an offer, so their acceptance decision is unobserved. For this population we applied the withdrawal rate of students at that school who did receive an offer to estimate their withdrawals.

Table 1 provides the aggregate summary of supply and demand for Ch. 74 programs by year, as estimated by Round 1 survey participants. In this table, we present the total number of applications from each of the schools that provided figures for a given year, including the total complete applications received, the total adjusted for withdrawn applications, and the estimated school capacity. We also report the total number of students that enrolled the fall after applying (by October 1). Note that sample size varies by year based on the fact that schools differed in the number of years of historical data they provided in Round 1. Thus, this table should not be used to draw conclusions about trends in supply and demand.

These application figures represent a lower bound estimate of demand for Ch. 74 programs because many potentially interested students may not submit an application for several reasons. Students may not be aware of the opportunity to apply to a Ch. 74 program, they may start but not complete the application, or they may know of programs but decide that none are close enough to their home to be viable options for enrollment. They nonetheless indicate that for every year of the sample, demand for Ch. 74 programs exceeded available supply in aggregate. Furthermore, there are fewer enrolled students than seats available, which occurs because some schools have fewer applicants than seats and thus some seats go unfilled.

Aggregate supply and demand analysis describes the general conditions for high school CTE market in Massachusetts, however, analysis of schools and programs that are oversubscribed provide additional insight into where and under what conditions excess demand has arisen. It also highlights supply shortages that may be masked by aggregate figures that include undersubscribed schools. This focused analysis provides a clearer direction for policy and supply responses to address this imbalance.

Table 2 presents aggregate supply and demand only among schools that report being oversubscribed in a given year, and that reported data for each of the five most recent years. Schools are considered oversubscribed in this study if complete applications minus withdrawals exceeds seats available for that application cycle. In the final column on the right (Total Excess Demand) charts the number of students who submitted a complete application (less withdrawals) who were not offered a seat. The total excess demand by year indicates that in each of the years from 2013-2017 there was substantial excess demand among oversubscribed programs.

Demand for seats within this stable sample increased about 33% over five years from 2,457 students representing excess demand in 2013 to 3,204 in 2017. This growth in demand suggests that among high-demand programs, demand grew substantially during this period. Furthermore, while seats available grew over the same period, growth in applications outpaced any increase in supply. The table also demonstrates that even oversubscribed schools might have some unused seats, since enrollment is below seats available. This outcome

might occur if admitted students drop out before October 1st and a new offer is not made to students on the waiting list.

Table 2: Trends in Supply and Demand for Chapter 74 Programs, Oversubscribed Schools Only

Year	Number of Responding Schools ¹	Total Complete Applications	Total Complete Apps Minus Withdrawals (Est) ²	Total Seats Available	Enrolled Students by 10/1	Total Unused Seats	Total Excess Demand
2017	17	9,578	8,472	5,268	5,336	95	3,204
2016	17	9,459	8,373	5,259	5,263	108	3,114
2015	17	9,315	8,287	5,165	5,217	72	3,122
2014	17	9,131	7,747	5,154	5,203	168	2,593
2013	17	8,987	7,595	5,138	5,194	97	2,457

1. Responding schools must have (at minimum) filled in complete applications, seats available, and enrolled student for that year
2. For oversubscribed schools, not all students were given an offer, so their acceptance decision is unobserved. For this population we applied the withdrawal rate of students at that school who did receive an offer to estimate their withdrawals.
3. Total seats available is less than total enrollment by 10/1 because seats available was based on projected seats available based on prior year's enrollment and does not reflect some natural turnover of previously enrolled students.

Schools are considered non-oversubscribed in this study if complete applications minus withdrawals does not exceed seats available for that application cycle. Schools have unused seats if more seats were available than students who enrolled. Some oversubscribed schools also have unused seats, which may occur if students drop out just before Oct 1st and a new student is not offered their seat. That some schools have unused seats while others have excess demand suggests that there could be geographical mismatch between supply and demand for seats. There are fewer schools that are not-oversubscribed and fewer unused seats than excess demand shown in prior tables, demonstrating that even if all unused seats were filled, excess demand would still exist across the whole system.

The geographic dispersion of employment and industry across the state suggests that analyzing supply and demand for Chapter 74 programs by workforce region is important. In Table 3, we present the relative supply and demand by workforce region. The exact region name is blinded to avoid revealing the specific schools that responded to the survey. This analysis highlights some important differences across the state. For instance, regions 3, 4, and 5 have the most excess demand in terms of raw number of total seats. In contrast, 4, 6, and 7 have the largest relative rate of oversubscription, given the smaller number of schools who responded. Restating this last point, the volume of excess demand, relative to regional supply (among respondents) is highest in regions 4, 5, and 6. Most regions have both unused seats and excess demand, demonstrating a mismatch between supply and demand within regions. This mismatch suggests that excess demand is not geographically specific, and that localized policies, within region, could help address imbalance across school contexts.

Table 3: Supply and Demand for Chapter 74 Programs by Workforce Development Region, 2017

WFD Region	Number of Responding Schools ¹	Oversubscribed Schools	Total Unused Seats	Total Excess Demand
1	2	0	42	0
2	5	2	299	174
3	7	5	28	1,103
4	4	4	0	1,742
5	12	6	409	1,151
6	10	7	105	854

7	2	2	0	106
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1. Responding schools must have (at minimum) filled in complete applications, seats available, and enrolled student for that year

To understand the potential for supply expansion, survey respondents were asked to identify the biggest constraints on their ability to offer additional seats at their school or in Ch. 74 programs. In Table 4 we present the summary of what schools indicated were their largest limitations on expanding supply. Building capacity appears to be the most common constraint, followed by teacher availability. Comprehensive schools were more likely to select other responses as well, such as equipment and collective bargaining. In the “other” write-in section, comprehensive schools emphasized the difficulty of finding vocationally-licensed teachers but did not indicate whether particular fields were more difficult to hire than others.

Table 4: Constraints on Seat Expansion

Constraint on seat expansion ¹	Percent of All Vocational Schools	Percent of Oversubscribed Vocational Schools	Percent of All Comprehensive Schools	Percent of Oversubscribed Comp. Schools
Building	78%	95%	78%	80%
Teachers	38%	45%	44%	40%
Collective bargaining	9%	9%	11%	20%
Equipment	13%	9%	28%	40%
Other	22%	9%	44%	60%
N	32	22	18	5

1. Response to the question: “Please identify the biggest constraints that currently prevent your school from accommodating more students (i.e. opening more seats).” Respondents were allowed to select multiple answers, so percentages do not sum to 100. Also only includes participants who completed this question by selecting at least one answer.

In Table 5, we include the proportion of vocational schools that include different applicant groups on their “waitlist” of students who do not receive an initial admission offer. This data confirms that there is substantial variation in how schools define waitlists. Among survey respondents, the most common definition includes all students with complete applications who meet minimum requirements. It is worth noting, however, that nearly one in five oversubscribed schools also require students to have passed a minimum application score to remain on the waitlist.

Table 5: How Vocational Schools Define Student Wait List for Admission

Students included on waiting list	Vocational schools ¹	Oversub. vocational schools only
All students with complete applications who meet minimum eligibility requirements and the minimum score cutoff	15%	19%
All students with complete applications who meet minimum eligibility requirements	36%	33%
All students with complete applications	33%	33%
Any student who submits an application, regardless of whether it is complete	0%	0%
Other criteria	9%	14%
NA – we do not maintain a waitlist	6%	0%
N	33	21

1. Vocational schools include regional vocational technical schools, municipal vocational technical schools, and agricultural vocational technical schools

Beyond the admissions process, schools also indicated differences in how they matched students to their permanent program of study. Per Chapter 74 requirements, students at vocational-type schools first participate in an exploratory program, typically in 9th grade, where they are exposed to a number of programmatic options before being matched with a program through the end of high school (see Figure 1). Almost all schools use a ranked order system to assign students to their permanent programs after exploratory, where both schools and students provided ranked preferences of fit for programs. Among schools that chose "Other" methods of assignment, text-based responses indicate that many schools have never had issues with oversubscription for programs and thus do not have a method to determine tie breaks if programs are oversubscribed.

Analysis of the extent to which schools were able to match students with their first or second program choice at the end of their exploratory year in 9th grade is presented in Table 6. Survey responses indicate that comprehensive schools are able to assign more students to their first or second choice program. It is likely the case that this higher match rate may be driven by the fact that there are fewer program offerings, on average, at comprehensive schools relative to regional vocational and technical schools.

Figure 1: Method of Assigning Students to Permanent Programs

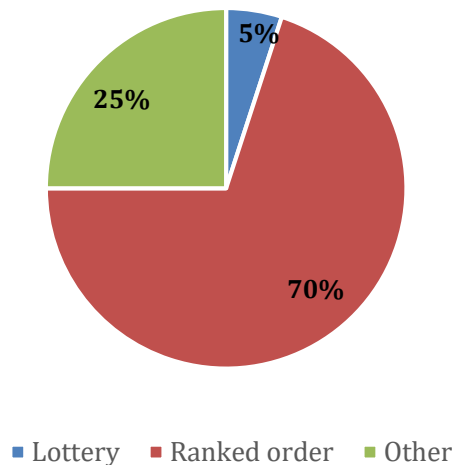


Table 6: Students Receiving First or Second Permanent Program Choice, 2017

School type	N	Average Percent of Students receiving first or second choice
Vocational schools ¹	20	83%
Comprehensive schools ²	9	96%

1. Vocational schools include regional vocational technical schools, municipal vocational technical schools, and agricultural vocational technical schools

2. Comprehensive schools excludes academic high schools that have fewer than 5 Chapter 74 programs

To assess whether Ch. 74 program selection aligns with labor market trends, we match high growth industries (as determined by Bureau of Labor Statistics projections) to aligned Ch. 74 clusters in Table 20. We also identify the number and proportion of students enrolled in these clusters to determine whether high growth industries also have high rates of enrollment.

Health-related industries are projected to have high growth and also represent a large proportion of Ch. 74 participants. Areas where Chapter 74 participation appears to outstrip anticipated job growth are in manufacturing, engineering, and technology, as well as transportation. Note that variation in local economic

conditions may deviate from the statewide projections from the BLS, so local Ch. 74 enrollment may in fact be better aligned to projections than the statewide aggregation might suggest.

Table 7: High Growth Industries in MA with Related Ch. 74 Program

NAICS Code	Industry Title	Related Ch. 74 Program Cluster	Proj. New Jobs from 2014-2024	Proj. Industry Growth	Number of Students in Ch. 74 Program	Percent of Students in Ch. 74 Program
620000	Health Care and Social Assistance	Health Services	91,882	15.70%	4,162	12%
621000	Ambulatory Health Care Services	Health Services	41,595	24.30%	4,162	12%
622000	Hospitals	Health Services	23,579	12.20%	4,162	12%
610000	Educational Services	Education	21,808	6.30%	1,378	4%
611000	Educational Services	Education	21,808	6.30%	1,378	4%
720000	Accommodation and Food Services	Hospitality & Tourism	16,514	5.70%	2,970	8%
722000	Food Services and Drinking Places	Hospitality & Tourism	14,379	5.70%	2,970	8%
623000	Nursing and Residential Care Facilities	Health Services	7,503	7.30%	4,162	12%
230000	Construction	Construction	6,880	5.30%	7,247	20%
238000	Specialty Trade Contractors	Manufacturing, Engineering & Technological	4,478	5.00%	5,511	16%
480000	Transportation and Warehousing	Transportation	3,773	4.80%	3,458	10%
510000	Information	Information Technology Services	2,573	3.00%	1,708	5%