Anticipating Change in the Massachusetts Teacher Workforce

by Antoniya Owens

Nationwide, baby boom teachers are beginning to retire in large numbers while student enrollment continues to rise. The trend is causing concern about impending shortages in many states. This article summarizes findings from a recent report evaluating future demand and supply dynamics in the Massachusetts teacher workforce. The report covers the academic years 2010-2011 through 2019-2020 and analyzes trends in the Commonwealth as a whole and in its 10 largest school districts.[1]   The approach may be of interest in other states.

Methodology

The report employs a teacher supply and demand model similar to that used by previous researchers.[2] The model is applied separately to district data for the 10 largest districts and to state data for total Commonwealth estimates. It first projects annual total demand for teachers based on forecasts of student enrollment and assumptions about student-teacher ratios. Enrollment projections for the state come from the Department of Elementary and Secondary Education.

For the districts, future enrollment is estimated using projections for their cohorts of five-year-olds, the children's average propensities to attend public school kindergarten, and the students' average grade progression rates from grades 1 through 12. To set up a range of projections for total teacher demand, student enrollment estimates are divided by three values of each district's student-teacher ratio—its average, lowest, and highest level from the past six years.

Total demand is then matched to the expected supply of teachers retained from the previous school year, estimated using state and district age-specific attrition rates. The gap between projected total demand and returning supply is the demand for *new* teachers—that is, the number of teachers the state or district will need to hire that year to staff all classrooms. In the calculations, each year's deficit is filled by adding the number of new hires necessary to exactly equate total teacher demand with teacher supply. These new hires are assumed to replicate the actual age distribution of teachers hired between 2007-2008 and 2008-2009. All teachers retained from the previous year are then made a year older, and the retention calculations are rerun on the resulting group of new hires and retained teachers. This algorithm is repeated for each school year through 2019-2020, continuously filling the gap between total demand and returning supply with new teachers and updating the age of the retained teachers.

Finally, to ascertain the impact of retirements on hiring needs, teachers age 58 and older—teachers' national median retirement age—who leave the workforce are assumed to be retirees. The importance of

retirements is then evaluated using the share of the workforce that retires each year, the fraction of total attrition that retirees constitute, and the portion of new hiring needs they necessitate. Note that if teachers are delaying retirement because of factors like increasing life expectancy or the current recession, using their historical median retirement age would likely overstate the impact of retirements on teacher hiring needs.

Teacher Hiring Needs

Over the next decade, the state will need to hire about 45,500 new teachers to fully meet teacher demand. Annual hiring needs are estimated to exceed 4,600 in 2010-2011 and decline below 4,300 by 2019-2020. (See "Projected Teacher Hiring Needs and Retirements.") State projections assume the student-teacher ratio will remain at 13.4, its average level over the past six years. (See "Projected Number of *New* Teachers Needed.") But the entire range of hiring-need projections is fairly narrow, with total new hires over the next decade ranging from 45,000 to just over 46,000.

Though these numbers are sizeable, they are not high enough to cause concerns about teacher shortages at the state level. Because Massachusetts student enrollment is projected to decline, the resulting annual demand for new teachers accounts for a smaller share of the previous year's teaching workforce—6.6 percent, on average—than the 7 percent that new hires constituted between 2007-2008 and 2008-2009. And in each of the past three years, more than 5,000 people completed teacher training programs leading to initial teaching licenses. If the supply of new teachers remains at those levels, it will be sufficient to meet and even exceed the state's overall hiring needs.

Individual district results show that some districts are more likely to experience teacher shortages than others. Because of enrollment declines and high teacher-retention rates, hiring needs in Lawrence and Worcester will likely be relatively low. Annual demand for new teachers in those districts will be between 6 percent and 8 percent of the previous year's workforce. Meanwhile, districts such as Springfield and Fall River will face significantly higher

demand and may struggle to find enough qualified teachers. Those cities are projected to replace about one-fifth of their teachers annually. New Bedford, Newton, and Boston are slightly behind, with annual hiring needs ranging from 12 percent to 14 percent of the previous year's teachers.

The dynamics in the districts with the greatest hiring needs typically result from growing student enrollments, high teacher turnover, or both. For instance, the substantial hiring needs in Fall River are due to both the projected growth in its student enrollment and its 19 percent teacher attrition rate. Similar trends hold for New Bedford, where student population is expected to grow by 15 percent by 2020—fastest among the 10 largest districts. In Springfield, by contrast, the demand for new teachers is almost entirely due to high attrition. Although its enrollment is projected to grow by only 2 percent over the next decade, 19 percent of Springfield's teachers left the district between 2007-2008 and 2008-2009.

The varying influence of these factors often results in vastly different hiring needs for districts with otherwise similar

Projected Teacher Hiring Needs and Retirements, 2010-2011 through 2019-2020

Number of new teacher hires needed to meet total demand

	Massachusetts	Boston	Springfield	Worcester	Brockton	Lowell	Lynn	New Bedford	Lawrence	Newton	Fall River
2010-2011	4,676	445	396	94	90	90	111	123	50	143	162
2011-2012	4,624	461	425	103	103	104	113	135	52	147	168
2012-2013	4,685	471	425	114	94	112	119	130	52	146	175
2013-2014	4,684	472	431	121	110	120	125	130	61	144	172
2014-2015	4,621	480	444	136	107	116	126	135	65	141	175
2015-2016	4,611	492	446	136	110	118	134	139	66	140	177
2016-2017	4,559	465	450	132	112	127	129	137	68	132	177
2017-2018	4,397	457	459	140	111	126	134	138	66	129	179
2018-2019	4,388	455	465	129	116	122	132	144	63	124	180
2019-2020	4,297	446	469	137	114	128	135	143	64	123	182
Total 2010-2019	45,543	4,642	4,411	1,242	1,067	1,164	1,259	1,353	606	1,370	1,746

Number of teachers retiring each year

	Massachusetts	Boston	Springfield	Worcester	Brockton	Lowell	Lynn	New Bedford	Lawrence	Newton	Fall River
2010-2011	2,039	122	69	42	15	26	24	19	17	29	29
2011-2012	2,080	122	67	45	14	30	28	19	16	26	24
2012-2013	2,049	120	66	52	13	28	24	26	15	22	26
2013-2014	2,025	118	67	48	18	32	28	23	15	20	24
2014-2015	1,982	116	65	54	15	30	24	24	14	19	23
2015-2016	1,893	107	62	55	15	27	28	23	13	17	23
2016-2017	1,821	106	61	50	16	32	28	23	13	16	23
2017-2018	1,745	105	61	56	13	28	27	24	13	14	23
2018-2019	1,677	98	61	50	14	26	28	23	12	14	22
2019-2020	1,619	96	61	51	13	25	26	24	11	13	23
Total 2010-2019	18,930	1,110	641	504	145	284	265	229	139	189	240

Source: Author's calculations using data from the Massachusetts Department of Elementary and Secondary Education.

characteristics. For example, Springfield and Worcester have similar student enrollments—about 23,000 and 25,000 in 2008-2009, respectively. However, Springfield's teacher attrition rate is more than twice as high, and its student population will likely grow while Worcester's is expected to shrink by 5 percent. As a result, annual hiring needs are projected to equal 20 percent of the previous years' teacher workforce in Springfield, but only about 8 percent in

constant or increase in Worcester, Lowell, Lynn, Brockton, and New Bedford. The district most affected by retirements is Worcester, where 40 percent of teachers are age 50 or older, and more than 3 percent are projected to retire annually. The shares of retirees are slightly lower in Boston, Springfield, Lowell, Lynn, New Bedford, and Fall River.

However, differences in both age-specific teacher attrition rates and projected student enrollments mean that the importance of

Endnotes

1   A. Owens, "The Massachusetts Teacher Workforce: Status and Challenges" (working paper, Rappaport Institute for Greater Boston, Kennedy School of Government, Cambridge, Massachusetts, May 2010).

2   D. Aaronson and K. Meckel, "How Will Baby Boomer Retirements Affect Teacher Labor Markets?" *Economic Perspectives* 4 (2009): 2-15; and W. Hussar, *Predicting the Need for Newly Hired Teachers in the United States to 2008-09* (Washington, DC: U.S. Department of Education, National Center for Education Statistics, 1998).

Projected Number of *New* Teachers Needed to Meet Demand in Massachusetts, 2010-2019
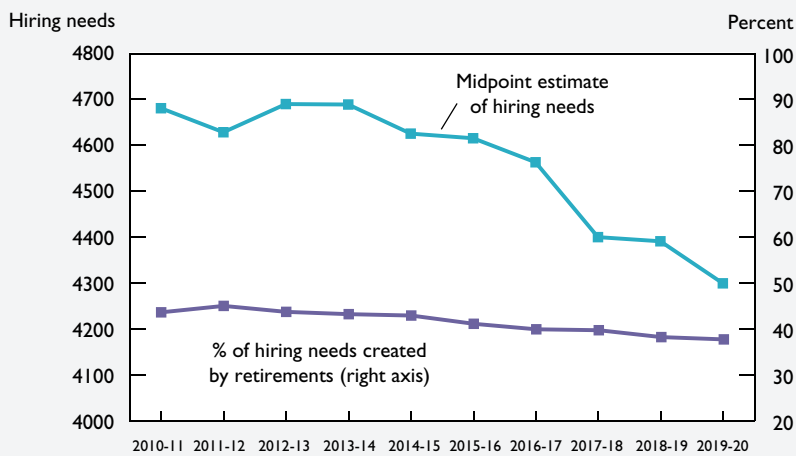
Source: Author's calculations using data from the Massachusetts Department of Elementary and Secondary Education

Worcester. In fact, Springfield will need roughly the same numbers of new teachers as Boston, whose student enrollment is more than twice as large.

The Role of Retirements

About 19,000 teachers will likely retire in Massachusetts over the next decade. Annual retirements between 2010-2011 and 2013-2014 are projected to be just over 2,000, declining to about 1,600 by the end of the decade. In relative terms, the numbers represent between 2.4 percent and 2.9 percent of each year's teacher workforce—shares similar to the 3 percent who retired between 2007-2008 and 2008-2009. Statewide, retirements will account for a significant portion of total teacher attrition—between 36 percent and 40 percent each year—and will create between 38 percent and 45 percent of the demand for new teachers.

Retirement trends and their impact differ substantially across districts, primarily because of differences in teachers' age distribution and their timing of retirement. Over the next decade, the annual number of teacher retirees will likely decline in Boston, Springfield, Lawrence, Newton, and Fall River, and remain

retirements in creating teacher hiring needs differs even for districts with similar retirement levels. For example, turnover among young teachers in Fall River and Springfield is particularly high, and enrollment in both districts is projected to grow. As a result, retirees will likely account for a relatively small share of annual exits and will create only about 12 percent to 15 percent of new teacher openings. Instead, most hiring needs in these districts will be necessitated by the growing enrollment and the high attrition of younger teachers. In contrast, although only slightly higher shares of teachers in Worcester are projected to retire each year, the impact of these retirements will be much more noticeable. Because of shrinking student enrollment and higher retention of young teachers, Worcester retirees will account for about 40 percent of annual teacher attrition and will create two out of every five new teaching positions.

Antoniya Owens, *a recent graduate of Harvard's Kennedy School of Government, conducted this research for the Massachusetts Department of Elementary and Secondary Education as part of her master's thesis.*