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|  | Status of the Massachusetts Educator Workforce: Focus on First-Year Teachers |
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| An analysis of the preparation, placement and retention of first-year teachers in Massachusetts.December 2013 |
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# Executive Summary

For the past three years, about 7 percent of Massachusetts teachers were in their first year of teaching, amounting to nearly 5,000 new teachers each year. These new teachers are the focus of this year’s Status of the Massachusetts Educator Workforce: who they are, where they are prepared, how long they stay, and the students they teach. As we describe in this report, first-year teachers teach a disproportionate share of students from low-income families and students who begin class behind their peers academically, making this group of teachers especially important for closing proficiency gaps in Massachusetts and for the equitable distribution of effective teachers across the state.

It is our hope that the data provided in this report will help guide teacher recruitment and retention efforts, especially in hard-to-staff areas, and help to improve the support ESE, preparation programs and school districts provide to first-year teachers. Below are some of the key findings in the report.

## Routes to Teaching

* One in four first-year teachers holds a preliminary license, which allows them to begin teaching with a bachelor’s degree once they have passed the *Massachusetts Tests for Educator Licensure* (MTEL).
* Teachers of color and male teachers are more likely to enter teaching with a preliminary license or through an alternative preparation route.
* About one-third of first-year teachers have worked previously in a public school in a non-teaching role. This share is highest in low-poverty schools and schools in the highest performance levels, i.e., Level 1 and Level 2, of the state accountability system.
* Almost sixty percent of preparation program completers were employed in a Massachusetts school within one year of program completion and the average distance to their first job was only 21 miles.

***Students Taught by First-Year Teachers***

* High poverty schools and schools in Level 4, the lowest performance level of the state accountability system, hire a disproportionately large share of first-year teachers. In 2012-2013, new teachers comprised 12 percent of the teaching staff in high poverty schools, compared to 5 percent in low poverty schools. Almost 16 percent of instructors at Level 4 schools are new teachers, compared to less than 10 percent for schools in higher accountability levels.
* Across all schools, students taught by first-year teachers have lower median student growth percentiles: 48.5 in math and 48.0 in ELA compared to 50 or higher for students taught by more experienced teachers. This pattern changes, though, based on schools’ poverty status, accountability level and charter school status.
* First-year teachers are more likely to be assigned students who are academically behind, when compared with students assigned to more experienced teachers.

***Retention Rates of First-Year Teachers***

* First-year teacher retention rates are lowest among Level 4 schools. Only 58 percent of first-year teachers in Level 4 schools are retained for one year, and only 42 percent remain teaching in the same school for two years.
* First-year teachers with low student growth scores are retained at a slightly lower rate than first-year teachers with high student growth scores. There is little difference in retention based on student growth among experienced teachers.
* Teachers who move schools after their first year of teaching tend to move to schools with similar, or higher, student performance. Very few teachers move to schools with the lowest student performance.

The Department of Elementary and Secondary Education (ESE) is committed to preparing all students to succeed in the world that awaits them after high school by: strengthening curriculum, instruction, and assessment; improving educator effectiveness; turning around the lowest performing schools and districts; and using data and technology to support student performance.

This report helps to achieve the agency’s strategic goal of **improving educator effectiveness** by clearly describing the current makeup and distribution of first-year teachers to a broad audience of educators, policymakers, researchers, families and other public education stakeholders in the Commonwealth. The data presented in this report are intended to encourage further research on the equitable distribution of effective educators across the Commonwealth, and to spur action on the part of policymakers to address inequities where they currently exist.

# About the Data

**Sources:** The data in this report come primarily from four sources: data reported to the state by districts through the Education Personnel Information Management System (EPIMS); data reported to the state by educators, preparation programs, or districts through the Educator Licensure and Recruitment system (ELAR); student coursework data reported to the state by districts through the Student Course Schedule (SCS); and statewide teacher and student demographic data available on ESE’s website.

**Data Limitations:** Data on teachers’ median student growth percentiles and school accountability levels are not available for all teachers. Only teachers with data in these areas are reported and those with missing data are omitted from the analyses.

**Definition of Educator:** We use the term *educator* in this report to refer to all staff employed in Massachusetts public schools and serving an educational role. In the 2013 school year, there was a total of 130,225 people employed in the Massachusetts public education system,[[1]](#footnote-1) serving 954,773 students in 1,849 schools and 403 school districts. They include teachers, principals, and superintendents, and others such as paraprofessionals, school business officials, and nurses. [[2]](#footnote-2) Custodial, food, and transportation staff that are included in state financial reporting systems but not reported in EPIMS are not included in our definition of this term.

**Definition of Teacher:** The term *teacher* includes those who are identified in EPIMS as classroom teachers, co-teachers, virtual school teachers, or support teachers who provide specialized content instruction, regardless of whether or not they are lead teachers. In 2013, the Massachusetts educator workforce included 73,995 teachers, along with 1,942 principals, and 330 superintendents.

**Definition of First-Year Teacher:** First-year or new teachers are defined as those who appeared in EPIMS as teachers for the first time since data collection began in the 2008 school year and who do not hold a professional license.[[3]](#footnote-3) Teachers in their second or higher year as a teacher or holding a professional license are referred to as *experienced teachers*. Because EPIMS only captures employment in Massachusetts public schools, some teachers who may have taught previously in a private school or outside of Massachusetts would be counted as first-year teachers. Based on this definition, a teacher who left teaching in a Massachusetts public school before the 2008 school year without earning a professional license would show up as a “first-year” teacher if he returned to teaching after the EPIMS data collection began.

**Shortage Subject Areas:** Shortage subject areas are those subjects that were reported as shortage areas to the U.S. Department of Education under Title II of the Higher Education Act. In the 2013 school year, the shortage subject areas were: special education, including moderate and severe disabilities; early childhood; speech, language, and hearing disorders; mathematics; modern foreign languages; sciences, including biology, physics, chemistry, earth science, and general science; English language arts and reading; and English as a second language.

**Low-Poverty and High-Poverty Schools:** Students from low-income families are defined as students who qualify for the federal free- or reduced-price lunch program. High-poverty schools are those where 60 percent or more of enrolled students are from low-income families and low-poverty schools are those where 10 percent or fewer of enrolled students are from low-income families. The 60 percent cut-off corresponds with the quartile of schools with the highest enrollment of students from low-income families and the 10 percent cut-off corresponds with the quartile of schools with the lowest enrollment of students from low-income families across the most recent three school years.

**Charter Schools:** Charter schools are independent public schools that operate under five-year charters granted by the Commonwealth's Board of Education. Charter schools are usually proposed by teachers, school leaders, parents, non-profit organizations, or other members of the community. There are 77 charter schools—including Commonwealth and Horace Mann charter schools—in Massachusetts.

**Determining License Type:** Teachers may hold multiple types of licenses at once, therefore a teacher’s license type is determined by the highest license earned in the typical progression of licenses: temporary, preliminary, initial, and professional.

# I. First-Year Teachers and the Massachusetts Educator Workforce in 2012-13

In this section, we present basic demographic and hiring information about first-year teachers. We find that these new teachers are slightly more likely to be male or teachers of color compared with more experienced teachers, and that they are more likely to be hired into schools that need additional academic supports, i.e., Level 4 schools and high poverty schools. We also share data on educator supply and demand, and find that despite recent increases in the number of people who complete preparation programs in shortage subject areas, there is still a shortage of educators who are licensed in special education fields.

## Demographics

In the 2013 school year, 73 percent of first-year teachers in Massachusetts were female, compared with 76 percent of teachers with more than one year of experience. Approximately 80 percent of all educators were female. There is variation by educator group, however—only 59 percent of principals and 42 percent of superintendents were female. These proportions are similar to those in public schools nationwide: 76 percent of teachers are female, but only 50 percent of principals and 24 percent of superintendents are female.[[4]](#footnote-4)

There is a large gap between the percentage of students of color in Massachusetts and the percentage of educators of color. Less than 10 percent of teachers, principals, and superintendents in Massachusetts are educators of color, compared with 44 percent of students (See Table 1.1). Racial and ethnic composition varies by teacher experience: 10 percent of new teachers are a racial or ethnic minority, compared with 7 percent of experienced teachers.

Because male teachers and teachers of color are underrepresented in Massachusetts, we spend additional time later in this report focusing on the recruitment and retention of these teachers.

## Table 1.1: 2012-13 Race and Ethnicity of Massachusetts Educators and Students

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Race/Ethnicity** | **Experienced Teachers** | **New Teachers** | **Principals** | **Superintendents** | **Students** |
| **African American** | 3% | 4% | 5% | 2% | 9% |
| **Asian** | 1% | 2% | 1% | 1% | 6% |
| **Hispanic** | 2% | 3% | 3% | 2% | 16% |
| **Other** | 1% | 1% | 0% | 1% | 3% |
| **White** | 93% | 90% | 91% | 95% | 66% |

As expected, new teachers tend to be younger than experienced teachers and the rest of the educator workforce. The median age for new teachers is 28. Of all new teachers, 36 percent are 25 years old or younger, 33 percent are between 26 and 32 years old, and 13 percent are between 33 and 40 years old. The remaining 18 percent are over 40 years old. The average age for experienced teachers is 43.5, and the average ages for principals and superintendents are 49.2 and 55.4, respectively. Very few teachers teach beyond age 65, the age at which one is eligible for full social security benefits. Principals have the highest proportion of individuals in the 41-48 years age group (28 percent). Superintendents are generally older than the other educator groups. About 54 percent of superintendents are age 57 or above and 14 percent are age 65 or above (See Chart 1.1).

## Chart 1.1 Age Distribution of Massachusetts Educators, 2012-2013

## New Teacher Hiring and Years of Service

All Massachusetts districts and schools with sufficient data are classified into one of five accountability and assistance levels; the highest performing districts and schools are placed in Level 1 and the lowest performing are placed in Level 5.[[5]](#footnote-5) A school’s accountability level drives the amount of support and intervention provided by ESE. Because of the additional attention that Level 3 and Level 4 schools receive from ESE and the importance of closing the proficiency gap among students with low incomes, we provide additional analyses in the remainder of the report by new teachers’ school accountability level and low-income enrollment.

The lowest performing schools in Massachusetts have the largest percentage of new teachers. As seen in Table 1.2 below, Level 3, Level 4, and high-poverty schools employ a higher percentage of new teachers. Charter schools also employ a much higher percentage of new teachers compared to non-charter public schools. Later in the report we dig deeper into the performance and retention of first-year charter school teachers.

## Table 1.2: Percentage of 2012-13 Teachers who are New Teachers, by School Characteristics

|  |  |
| --- | --- |
| **Statewide** | **7.1** |
| **School Accountability Level** |
| Level 1 | 6.8 |
| Level 2 | 5.9 |
| Level 3 | 8.8 |
| Level 4 | 15.9 |
| **Low-Income Enrollment** |
| Low Poverty | 5.4 |
| High Poverty | 12.2 |
| **Charter Status** |
| Non-charter Schools | 6.6 |
| Charter schools | 28.3 |

The share of new teachers also varies by grade level, subject area, and student population taught (See Chart 1.2). High schools and shortage subject areas—with the exception of early childhood education— had higher than average shares of first-year teachers in the 2012-2013 school year, indicating that retention rates may be lower in these subject areas.

## Chart 1.2: 2012-13 Teachers who are First-Year Teachers, by Teaching Assignment

Across all Massachusetts educators in the 2012-2013 school year, approximately 11 percent worked less than one year in their districts. About 39 percent of teachers worked 0 – 5 years in their districts, while 22 percent served 6 – 10 years, and 28 percent served 11 – 20 years (See Chart 1.3). Forty-three percent of principals have been in their districts 0 – 5 years, while 19 percent worked 6 – 10 years, and 24 percent served 11 – 20 years. The share of teachers and principals in their first year at a district is consistent with national averages.[[6]](#footnote-6) A slightly larger proportion of principals than teachers have remained in their districts for more than 20 years (15 percent of principals versus 11 percent of teachers). Superintendents appear to have shorter tenure in their districts, with 56 percent serving five or fewer years and 10 percent remaining for more than 20 years.

## Chart 1.3: Massachusetts Educators by Years of Service in their District, 2012-2013

##

## Educator Shortages

When school districts cannot find an educator with the proper license for a job opening they can apply to the state for a waiver that allows them to hire someone who does not have the necessary license—this may be a new or experienced educator who lacks the correct license for the position. Before they can receive a waiver, districts must demonstrate to ESE that they have been unable to find a properly licensed educator who is qualified for the position, therefore waiver data provides a window into the number and types of educator shortages in the state. As Table 1.3 shows, special education remains an area with large shortages. In the 2012-2013 school year, 459 waivers were issued for special education fields, accounting for 73 percent of all waivers.

## Table 1.3: 2012-13 Waivers Issued by Shortage Subject Area

|  |  |  |
| --- | --- | --- |
| **Subject Area** | **# Issued in 2012-13** | **Percent of Total** |
| **Not Shortage Area**  | **87** | **13.8%** |
| **Shortage Area** | **542** | **86.2%** |
| Moderate Disabilities | 291 | 46.3% |
| Severe Disabilities | 136 | 21.6% |
| STEM Fields | 35 | 5.6% |
| Other Special Education Areas | 32 | 5.1% |
| English Language Arts | 23 | 3.7% |
| Foreign Languages | 13 | 2.1% |
| English as a Second Language | 6 | 1.0% |
| Early Childhood | 6 | 1.0% |

Overall, the number of waivers issued declined substantially between 2008 and 2013, dropping 80 percent from 3,145 to 629. This is the result of a steady decline over six years followed by a sharp reduction in the 2012-2013 school year as a result of court-mandated changes to how ESE reviews and approves waiver requests (Chart 1.4).[[7]](#footnote-7)

## Chart 1.4: Total Number of Waivers Issued, 2007-08 – 2012-13

The decline in waivers prior to the 2012-2013 school year coincided with an increase in the number of candidates completing teacher preparation program in shortage fields. As Chart 1.5 shows, the number of candidates completing programs in moderate disabilities, English language arts, English as a second language, early childhood, and STEM (science, technology, engineering and math) fields has increased over that same time period. Meanwhile the overall number of program completers dropped slightly from 4,989 to 4,734.[[8]](#footnote-8) But, there have not been substantial increases in program completers in severe disabilities or other special education fields, such as special education administrators and speech, language, and hearing disorder specialists.

## Chart 1.5: Teacher Preparation Program Completers in Shortage Subject Areas, 2007-08 – 2011-12

Despite the increase in the number of program completers, moderate disabilities still accounts for the largest share of waivers issued in the 2012-2013 school year, indicating that there are not enough candidates to meet the demand or that candidates who are licensed to teach students with moderate disabilities are not applying for those job openings. In the sections that follow, we provide additional analyses of new teacher preparation, employment, and retention by shortage areas with the hope that this data will inform efforts to meet district demand for these teachers.

# II. Routes to Becoming a First-Year Teacher

This section includes data on the many ways in which teachers enter the profession: through a traditional, higher education preparation program, through an alternative, non-higher education based preparation program, or with an alternative preliminary license that does not require formal preparation. While most teachers enter through a traditional route, those that enter through an alternative preparation or licensure route are more likely to be male or teachers of color. Almost 60 percent of program completers work in Massachusetts the year after program completion and they do not go far: The average distance from a teacher’s preparation program to his or her first job is just 21 miles. This finding underscores the importance of strong partnerships between districts and preparation programs.

## Licensure Routes to Teaching

Teachers can begin working in a Massachusetts public school with one of three types of licenses: temporary, preliminary or initial. Most new teachers enter the classroom with an initial license, which requires teachers to complete an approved teacher preparation program and pass the appropriate Massachusetts Tests for Educator Licensure (MTEL).

The temporary license is granted by ESE to out-of-state teachers who wish to teach in Massachusetts, but who still need to take and pass the MTEL. The temporary license is valid for one year, during which teachers must pass the appropriate MTEL exams. The preliminary license provides an alternative route to employment that allows teachers to begin teaching with a bachelor’s degree and a passing score on the appropriate MTEL exams. Teachers can teach for five years under a preliminary license and during that time they must earn an initial license by completing an approved preparation program or the Performance Review Program for Initial Licensure.[[9]](#footnote-9) As Table 2.1 shows, 1 in 4 new teachers in the 2012-2013 school year held a preliminary license.

## Table 2.1: Percent of 2012-13 Teachers by License Type

|  |  |  |
| --- | --- | --- |
|  | **First-Year Teachers** | **Experienced Teachers** |
| Temporary License  | 0.9% | - |
| Preliminary License | 26.2% | 5.3% |
| Initial License | 73.0% | 26.3% |
| Professional License | - | 68.3% |

Because it provides a faster route into the classroom, the preliminary license is intended to attract career changers and fill positions in shortage areas, such as math and science. The average age for a first-year teacher with a preliminary license is 33 years, slightly higher than 30 years, the average age of initial-licensed first-year teachers. This indicates that the preliminary license may be attracting candidates with work experience outside of public education. Also, new teachers with a preliminary license are more likely to teach at the middle or secondary level and are less likely to teach at the elementary level compared with new teachers with an initial license (See Table 2.2). This may indicate that there are more job openings at the middle or high school level or that these teachers’ external experiences translates better to teaching at the middle or high school level.

## Table 2.2: Percent of 2012-13 First-Year Teachers by License Type and Grade Level

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Elementary School** | **Middle School** | **High School** |
| Temporary License | 0.9% | 1.0% | 0.9% |
| Preliminary License | 19.9% | 34.2% | 35.4% |
| Initial License | 79.2% | 64.8% | 63.8% |

Among new teachers at the middle or secondary level, 51 percent of those teaching a foreign language hold a preliminary license, higher than the average for first-year middle and high school teachers (Table 2.3). However, a below average percentage of mathematics, science and English language arts teachers have a preliminary license. Preliminary licensed first-year teachers are also less likely to have a special education assignment, but more likely to teach English language learners. The preliminary license may be helping to fill hiring needs in some, but not all, shortage subject areas.

## Table 2.3: Percent of 2012-13 First-Year Teachers by Shortage Subject Areas and License Type

|  |  |
| --- | --- |
| **Subjects Taught** **(Middle or High School Grades Only)** | **Students Taught** |
|  | **Math** | **Science** | **Foreign Language** | **English Language Arts/Reading** | **Early Childhood Grades** **(PK – 2)** | **Special Education Students** | **English Language Learners** |
| Temporary License | 1.1% | 0.9% | 0.0% | 1.3% | 0.5% | 1.2% | 1.4% |
| Preliminary License | 23.1% | 27.3% | 51.0% | 18.9% | 15.9% | 18.6% | 36.4% |
| Initial License | 75.8% | 71.8% | 49.0% | 79.9% | 83.6% | 80.2% | 62.1% |

The preliminary license does appear to fill a need for new teachers at high-need schools, however. As Table 2.4 shows, a slightly higher percentage of first-year teachers at Level 3 or Level 4 schools and high-poverty schools held a preliminary license. Licensure data in Table 2.4 is not disaggregated by charter school status because charter school teachers are subject to different licensure requirements; therefore, 45 percent of the 2012-2013 school year first-year charter school teachers did not have active teaching licenses. Of those that did, 32 percent held a preliminary license.

## Table 2.4: Percent of 2012-13 First-Year Teachers by School Characteristics and License Type

|  |  |  |
| --- | --- | --- |
|  | **School Accountability Level** | **School Low-Income Enrollment** |
|  | **Level 1** | **Level 2** | **Level 3** | **Level 4** | **Low Poverty** | **High Poverty** |
| Temporary License | 0.8% | 1.0% | 0.8% | 2.3% | 1.0% | 0.8% |
| Preliminary License | 24.2% | 23.8% | 29.0% | 34.9% | 20.6% | 29.8% |
| Initial License | 75.0% | 75.2% | 70.2% | 62.9% | 78.4% | 69.3% |

The preliminary license also appears to attract more teachers of color and male teachers, two groups that are currently underrepresented in the Massachusetts educator workforce. As Table 2.5 shows, 43 percent of first-year teachers of color and 40 percent of first-year male teachers held a preliminary license compared with 26 percent of all first-year teachers. This pattern continues among teachers with more than one year of experience, with a higher share of teachers of color and male teachers holding a preliminary license and a smaller percentage holding a professional license.

## Table 2.5: Percent of 2012-13 Teachers by License Type and Race and Gender

|  |  |  |
| --- | --- | --- |
|  | **First-Year Teachers** | **Experienced Teachers** |
|  | **All Teachers** | **Teachers of Color** | **Male Teachers** | **All Teachers** | **Teachers of Color** | **Male Teachers** |
| Temporary License | 0.9% | 1.5% | 1.2% | - | - | - |
| Preliminary License | 26.2% | 43.1% | 39.9% | 5.3% | 12.3% | 10.6% |
| Initial License | 73.0% | 55.4% | 58.9% | 26.3% | 33.5% | 33.8% |
| Professional License | - | - | - | 68.3% | 54.1% | 55.6% |

## Teacher Preparation Programs

In the 2011-2012 school year, about 4,700 teachers completed a Massachusetts teacher preparation program for an initial teaching license. Table 2.6 shows the breakdown of these completers by the type of organization in which they were prepared. Of the 80 educator preparation organizations in Massachusetts, 57 are colleges or universities. The remaining 23 non-higher education organizations include 9 private organizations, 5 collaboratives, 3 charter schools, 3 public school districts, 2 professional associations and one private school.

## Table 2.6: Percent of 2011-12 Teacher Preparation Program Completers by Organization Type

|  |  |
| --- | --- |
|  **Organization Type** | **Percent of Program Completers** |
| Private College or University | 55.7% |
| Public Higher Education System—State University Institution | 26.2% |
| Public Higher Education System—UMass Institution | 10.5% |
| Non-Higher Education Organization | 7.7% |

Non-higher education organizations typically offer alternative preparation routes through which teachers can earn their teaching credentials while working as a teacher. As Chart 2.1 shows, these alternative programs are enrolling a disproportionately large number of teachers of color and male teachers and teachers in shortage subject areas—higher than the proportion of these underrepresented teachers in the current workforce. This is consistent with data nationwide, which shows higher proportions of males and individuals of color in alternative programs.[[10]](#footnote-10) UMass institutions also enrolled a higher share of male teachers and teachers of color in comparison to the current teacher workforce.

## Chart 2.1: 2011-12 Preparation Program Candidates by Organization Type, Demographics and Subject Area Completed

Of the prospective teachers who completed a preparation program in the 2011-2012 school year, almost 60 percent became employed in a Massachusetts public school within one year. Not all program completers who became employed were employed immediately as a teacher, however. Forty-seven percent of program completers were employed as a teacher in Massachusetts in their first year after program completion. Chart 2.2 breaks out employment rates by organization type, showing that a higher percent of teachers who complete programs at public higher education institutions or at a non-higher education organization became employed in a Massachusetts public school within one year. And among those who became employed, there are differences among organization types in the percent who were employed as a teacher. As we discuss below, this may be because of the mix of programs offered at different organizations, including whether they are at the baccalaureate or post-baccalaureate level and the subject areas offered.

## Chart 2.2: Employment of 2011-12 Initial License Teacher Preparation Program Completers in a Massachusetts Public School, by Organization Type

As Chart 2.3 and Chart 2.4 show, employment varies by the type of program prospective teachers complete and the subject area on which they focus. In post-baccalaureate apprenticeship/teacher of record preparation programs, which are offered by non-higher education organizations, candidates work full-time in a school while completing the coursework and supervised teaching necessary to gain an initial teaching license. As a result, a higher percentage of alternative program completers are employed in a Massachusetts public school after program completion as compared to traditional program completers.

Among traditional program completers, those completing a post-baccalaureate program have higher employment rates than those who complete a baccalaureate program, and are also more likely to get employed as a teacher.

## Chart 2.3: Employment of 2011-12 Initial License Teacher Preparation Program Completers in a Massachusetts Public School, by Program Type

Overall, the employment rate for most shortage subject areas is higher than the employment rate across all subjects and a larger percent of those who get employed are employed as a teacher (Chart 2.4). Teachers who complete English preparation programs are an exception, with only 55 percent becoming employed in a Massachusetts public school within one year. Teachers completing programs in Severe Disabilities and Early Childhood also have lower employment rates in Massachusetts public schools, potentially because the data presented below does not include employment in private, early education programs or in private special education schools that receive state funds.

## Chart 2.4: Employment of 2011-12 Initial License Teacher Preparation Program Completers in a Massachusetts Public School, by Shortage Subject Area

Recent teacher preparation program completers who became employed in a Massachusetts public school tended to stay close to where they were prepared: half of program completers worked within 13 miles of their preparation program and 75 percent worked within 25 miles.[[11]](#footnote-11) This pattern remains true across organization types—the average distance to the first employing school ranges from 14 miles among non-higher education organizations to 22 miles among private colleges and universities. This is consistent with research showing that teachers prefer to take jobs that are close to where they attended college or to their home town.[[12]](#footnote-12)

## Chart 2.5: Distance between Preparation Program and the First Employing School, among 2010-11 and 2011-12 Teacher Preparation Program Completers

The fact that new teachers tend to stay close to their preparation program underscores the importance of strong partnerships between preparation programs and nearby school districts. By knowing that most program completers work within 20 miles, preparation programs can tailor the content and focus of their programs to the needs of districts in that radius and can help to address local educator shortages by recruiting candidates in shortage subject areas.

## Prior Work in a Massachusetts Public School

A first-year teacher is defined in this report as someone who appears as a teacher for the first time in the state’s EPIMS data collection and who does not hold a professional license. But 32 percent of these “new” teachers appeared previously in another role, indicating that a large portion of the teaching workforce has experience working in a public school before becoming a teacher.

Table 2.7 details the previous roles held by new teachers in the 2012-2013 school year who worked in a Massachusetts public school in a prior year. Overwhelmingly, these new teachers held positions as paraprofessionals, long term substitute teachers, tutors, and other instructional support staff before becoming a teacher. This pattern looks slightly different for new teachers of color and new male teachers. Fewer first-year teachers of color worked as a paraprofessional or long-term substitute teacher before teaching, but a higher percentage worked in administrative support roles or as clerical staff. Among new male teachers, a higher percentage worked as a long term substitute teacher or in administrative support before teaching.

## Table 2.7: Roles Held by 2012-13 First-Year Teachers Who Appeared Previously in EPIMS

|  |  |  |  |
| --- | --- | --- | --- |
|  | **All New Teachers** | **New Teachers****of Color** | **Male New Teachers** |
| Paraprofessional | 69.3% | 56.8% | 60.4% |
| Long term substitute | 16.8% | 10.3% | 22.0% |
| Tutor | 7.1% | 9.6% | 8.3% |
| Other Instructional Support | 4.9% | 6.8% | 4.8% |
| Administrative Support | 2.2% | 11.6% | 4.5% |
| Other Special Ed Staff | 4.6% | 0.7% | 3.2% |
| Clerical staff | 4.6% | 12.3% | 4.5% |
| Instructional Coach | 1.5% | 1.4% | 1.9% |
| Administrator | 1.0% | 4.8% | 2.6% |

Note: Because teachers may have held multiple roles previously, percentages total to more than 100%. Administrator roles include roles such as supervisor/director positions, principals and special education administrators.

A higher percentage of white and female new teachers worked previously in a Massachusetts public school, compared with teachers of color and male teachers (see Chart 2.6). And, as Chart 2.7 and Chart 2.8 show, a higher percent of new teachers in Level 1 and Level 2 schools, elementary grades, and English language arts, have worked previously in a Massachusetts public school. This is also true for first-year teachers in low-poverty schools. This may indicate that, due to the higher competition for these jobs, candidates need to demonstrate work experience in the field before becoming a teacher. Alternatively, it may indicate that some schools encourage support staff to pursue certification and return in a teaching role.

## Chart 2.6: First-Year 2012-13 Teachers who Worked Previously in a MA Public School, by Teacher Demographics

## Chart 2.7: First-Year 2012-13 Teachers who Previously Worked in a MA Public School, by School Accountability Level and Poverty Status

## Chart 2.8: First-Year 2012-13 Teachers who Previously Worked in a MA Public School, by Subject and Grade Level

# III. First-Year Teachers and Student Performance

In this section, we discuss the academic performance and growth of students taught by first-year teachers. The story told by this data is concerning: First year teachers are disproportionately hired into the highest need schools and are placed in classrooms with students that need the most help, but are not as well equipped as more experienced teachers to help students grow academically. This pattern only serves to further handicap students that are already academically behind and may contribute to the frustration and low retention rates among new teachers.

## Growth of Students Taught by New Teachers

A student growth percentile (SGP) measures how much a student’s performance on the MCAS exam changed relative to other students statewide with similar MCAS scores in previous years. Student growth percentiles range from 1 to 99 where higher numbers represent higher growth and lower numbers represent lower growth. To summarize student growth rates by a group (subgroup, grade, classroom, etc.) individual SGPs can be aggregated. The most appropriate measure for reporting SGP for a group is the median SGP, the middle score if one ranks the individual SGPs in a group from highest to lowest[[13]](#footnote-13). Here we report teacher median SGP, which is the median SGP of students in all of a teacher’s classes. In this report we use teacher median SGPs to compare the academic growth of students of one group of teachers with another group of teachers.

Consistent with research on the effectiveness of new teachers, students taught by new teachers in Massachusetts experience lower academic growth compared with students taught by more experienced teachers.[[14]](#footnote-14) As Chart 3.1 shows, first-year teachers’ median SGP is 3 points lower in ELA than teachers with four or more years of experience and 3.5 points lower in math. This difference is equal to .2 standard deviations in ELA, and .21 standard deviations in math. In comparison, the gap between the median growth percentile of students who qualify for free or reduced-price lunch and students who do not qualify for free lunch in Massachusetts is 0.24 standard deviations in ELA and .21 standard deviations in math. Therefore, the difference in student academic growth between students of first-year teachers and experienced teachers is similar to the difference in growth between low-income and high-income students.

## Chart 3.1: Median Student Growth Percentiles of 2010-11 and 2011-12 Teachers by Years of Teaching

The student assignment data presented in the following section complicates this picture: it is possible that new teachers’ lower growth is partly explained by the fact that they tend to teach students who start the year academically behind. But, even controlling for students’ prior performance, students assigned to first-year teachers have significantly lower growth, by an average of two percentile points, than students assigned to more experienced teachers.

Chart 3.2 below breaks out this data by teachers in charter and non-charter public schools. On average, students in charter schools in Massachusetts have higher growth compared with students in non-charter public schools and this translates into higher median growth percentiles among charter school teachers, including first-year teachers. First-year teachers at charter schools have a median growth of 54 in mathematics and 56 in ELA, compared with a growth percentile of 48 in mathematics and 46.5 in ELA among first-year teachers in non-charter public schools. The growth percentiles among charter school teachers, however, begin to drop off in later years and median growth begins to converge with teachers in non-charter public schools, whose median student growth continues to increase in later years.

## Chart 3.2: Median Student Growth Percentiles of 2010-11 and 2011-12 Teachers by Years of Teaching and Charter School Status

Because of the large differences in SGP between new teachers at charter schools and new teachers at non-charter schools, Charts 3.3 through 3.5 include only the growth data for students assigned to non-charter school teachers. Among teachers in Level 4 schools, the growth of students taught by first-year teachers is two points lower in ELA compared with the growth of students taught by teachers with four or more years of experience, but is three points *higher* in mathematics (Chart 3.3 and Chart 3.4). The changes in the SGP of Level 4 second- and third-year teachers should be interpreted with caution and may be due to the small number of teachers included in this analysis. Across Level 1, Level 2, and Level 3 schools, first-year teachers have a lower median SGP in both mathematics and ELA when compared with teachers with four or more years of experience.

## Chart 3.3: Median Math Student Growth Percentiles of 2010-11 and 2011-12 Non-Charter School Teachers by Years of Teaching and School Accountability Level

Note: Sample sizes for first, second and third-year teachers in Level 4 schools are small and results should be interpreted with caution.

## Chart 3.4: Median ELA Student Growth Percentiles of 2010-11 and 2011-12 Non-Charter School Teachers by Years of Teaching and School Accountability Level

Note: Sample sizes for first, second and third-year teachers in Level 4 schools are small and results should be interpreted with caution.

The median student growth percentile of students of first-year teachers in high-poverty schools is 45 in mathematics and 47 in English language arts, lower than in low-poverty schools, where students of first-year teachers had a median growth percentile of 53 in mathematics and 53.5 in English language arts (See Chart 3.5). First-year teachers in low-poverty schools may benefit from working with larger proportions of experienced teachers when compared to first-year teachers in high-poverty schools.

## Chart 3.5: Median Student Growth Percentiles of 2010-11 and 2011-12 Non-Charter School Teachers by Years of Teaching and School Low-Income Enrollment

## New Teacher Classroom Placement

Using data from its partner school districts in North Carolina, Texas, and Georgia, the Strategic Data Project at Harvard University released a report in 2012 showing that students assigned to first-year teachers start the year academically behind students who are assigned to teachers with four or more years of experience.[[15]](#footnote-15) This same pattern exists in Massachusetts. Chart 3.6 and Chart 3.7 show the average difference between the incoming MCAS scores (the Massachusetts statewide student assessment) of students assigned to first-year teachers in mathematics and English language arts, compared with the incoming MCAS scores of students assigned to teachers with four or more years of experience. The results are translated from standard deviations to months of learning based on the grade level and subject area.[[16]](#footnote-16)

Both the ELA and mathematics results show that the difference in prior year MCAS scores of students assigned to first-year teachers compared with students assigned to teachers with four or more years of experience is greatest when comparing teachers across the state and lessens when comparing teachers within districts and within schools. The right side bar in these charts compares first-year teachers’ students with experienced teachers’ students *within the same school*. In mathematics, first-year teachers are assigned students 1.7 months behind students assigned to more experienced teachers in grades 4 – 5 and assigned students almost six months behind in grades 6 – 8, within the same school. In ELA, first-year teachers teach students who start the year one month behind their peers in grades 4 – 5 and 2.5 months behind in grades 6 – 8, compared with students assigned to more experienced teachers.

## Chart 3.6: Difference in Prior Year MCAS Math Scores of Students Assigned to First-Year Teachers Compared with Students Assigned to Teachers with Four or More Years of Experience.

## Chart 3.7: Difference in Prior Year MCAS ELA Scores of Students Assigned to First-Year Teachers Compared with Students Assigned to Teachers with Four or More Years of Experience.

This pattern is exacerbated by the fact that schools and districts that enroll more lower-performing students also hire a larger share of first-year teachers. The middle bar on the graphs shows the difference for students assigned to first-year teachers across schools within a district. Because schools with lower-performing students hire a larger share of first-year teachers, first-year teachers teach students who are 1.8 to 4.4 months behind in ELA and 2.1 to 6.2 months behind in mathematics compared with students taught by more experienced teachers in the same district.

The bar on the left shows this effect across the entire state, with the result being that first-year teachers are teaching students 3.3 months behind in grades 4–5 mathematics and eight months behind in grades 6–8 math. In ELA, first-year teachers are assigned students 5.5 months behind in grades 4–5 and nine months behind in grades 6–8.

This pattern has the potential to negatively impact both students and new teachers. Assigning students who are already academically behind to first-year teachers makes it more difficult for those students to catch up. It may also increase burnout among first-year teachers unless they receive the support and mentoring needed to effectively teach in high-needs schools.

# IV. New Teacher Retention

In the 2010-2011 school year, the Commonwealth’s schools hired 4,699 new teachers. Within one year, Massachusetts lost more than 910 of these new teachers—19.4 percent of those who had been hired. In comparison, national research on teacher turnover found that 10 percent of new teachers left teaching after one year, a lower turnover rate than in Massachusetts.[[17]](#footnote-17) Teacher turnover imposes stress on school systems and students because it disrupts the community central to strong schools. Underperforming schools are often staffed by inexperienced teachers (See Section I), therefore new teacher turnover can be especially taxing for these schools and their students.[[18]](#footnote-18) Here we explore in-school retention rates for the 2010-2011 school year first-year teachers by school accountability level status, subject area, and the median growth of teachers’ students.

## One- and Two-Year Retention Rates

As seen in Chart 4.1 below, first-year teachers had lower one- and two-year retention rates than experienced teachers: 80.7 percent of first-year teachers in the 2010-2011 school year remained teaching after one year and 73.9 percent remained teaching after two years. In contrast, 91.4 percent of teachers with more than one year of experience who were teaching in the 2010-2011 school year remained for one year, and 85.6 percent remained for two years.

Retention rates for teachers in the same school is even lower, with just 54.2 percent of new teachers and 75.1 percent of teachers with more than one year of experience staying in the same school for two years.

## Chart 4.1: Teachers Retained in a Massachusetts Public School Statewide, within District and within School from 2010-2011 to 2012-13

One- and two-year retention rates for first-year and experienced teachers differ by school accountability levels (See Chart 4.2). For both first-year and experienced teachers, retention rates are highest at Level 1 schools and decline in Level 3 and Level 4 schools. One- and two-year retention rates are the lowest in Level 4 schools. One- and two-year retention rates for first-year teachers differ by 16.2 points between Level 1 and Level 4 schools.

## Chart 4.2: Teachers Retained in School by School Accountability Level

Chart 4.3 breaks down employment rates by school poverty level. As the chart shows, retention rates are similar across low- and moderate-poverty schools, but drop for teachers in high-poverty schools. One-year retention rates, for example, decline from 71.3 percent to 62.2 percent for first-year teachers and from 87.5 percent to 79.7 percent for experienced teachers. This trend, along with the lower retention rates among Level 4 schools, is consistent with other research showing higher teacher turnover among schools with larger disadvantaged student populations and lower performance.[[19]](#footnote-19)

## Chart 4.3: Teachers Retained in School by School Poverty Level

An analysis of teacher retention by charter schools and non-charter schools shows that retention rates are lower in charter schools than in non-charters, though one-year retention rates for new teachers were similar for both charter and non-charter schools (67.3 percent and 69.3 percent, respectively).

## Chart 4.4: Teachers Retained in School by School Charter Status

Retention rates among new teachers of color and male teachers are slightly lower than rates for white and female new teachers, as can be seen in Chart 4.5 below. Teachers of color had a one-year retention rate about five points lower and a two-year retention rate eight points lower than white teachers. Retention rates were much closer between female and male teachers (a difference of between 0.4 and 0.9 points).

## Chart 4.5: 2010-11 New Teachers Retained by Teacher Demographics

Retention rates of new teachers differ slightly by the subject areas taught, but they appear to differ more according to school accountability level (Chart 4.6). Two-year retention rates were lowest for Level 4 schools across all subject areas, and one-year retention rates were lowest in Level 4 schools for both math and science teachers. ELA teachers in Level 4 schools had 1-year retention rates similar to ELA teachers in Level 1 and Level 2 schools.

## Chart 4.6: Within-school Retention Rates for 2010-2011 First-year Teachers by School Accountability Level and Subject Area

Teacher retention rates decrease with school level status in elementary and high schools but not in middle schools (Chart 4.7). This indicates that there may be more complex issues at play that impact teachers’ decisions to remain teaching in middle schools.

## Chart 4.7: Within-school Retention Rates for 2010-11 First-Year Teachers by School Accountability Level and School Type

New teachers with low growth in ELA or math tend to exit teaching at slightly higher rates than new teachers with moderate and high growth, but the differences are small. Among teachers with low median student growth in ELA, for example, 83.9 percent remained in teaching compared with 87.3 percent of teachers with high ELA student growth. The differences among experienced teachers are even smaller: 90.9 percent of experienced teachers with low ELA growth remained teaching, compared with 92.6 percent of experienced teachers with high ELA student growth (See Chart 4.8 and Chart 4.9). This is consistent with national research that shows that teachers with lower growth scores tend to leave teaching at higher rates than teachers with high growth.[[20]](#footnote-20) To the extent that teachers with lower median SGPs are lower-performing than teachers with higher median SGPs, this attrition may not necessarily be bad.

## Chart 4.8: One-Year Retention Rates of 2011-12 Teachers by Teachers’ Median Student Growth Percentile in English Language Arts

## Chart 4.9: One-Year Retention Rates of 2011-12 Teachers by Teachers’ Median Student Growth Percentile in Math

## Next Steps for New Teachers

With the exception of those in Level 4 schools, most new teachers who moved schools after one year tended to stay in schools at the same accountability level. For example, of new teachers who taught in a Level 1 school in the 2011 school year and changed schools after one year, 32 percent taught in a Level 1 school in the 2012 school year. This trend is similar among Levels 2 and Levels 3 schools. Among teachers leaving a Level 4 school, however, only 14.7 percent taught in a different Level 4 school in the following year. Teachers who change schools do not generally move to schools of lower accountability levels in the following year (Table 4.1). This is consistent with research on teacher mobility, which shows that when teachers move across schools they tend to move out of lower performing schools and into higher performing schools.[[21]](#footnote-21)

## Table 4.1: Distribution of 2010-11 First-Year Teachers who Changed Schools, by the 2011-12 School’s Accountability Level

|  |  |
| --- | --- |
| **2011 School Accountability Level** | **2012 School Accountability Level** |
| **Level 1** | **Level 2** | **Level 3** | **Level 4** |
| **Level 1** | 32.3 | 49.5 | 18.2 | 0.0 |
| **Level 2** | 32.7 | 48.8 | 18.5 | 0.0 |
| **Level 3** | 25.8 | 28.3 | 37.5 | 8.3 |
| **Level 4** | 20.6 | 17.6 | 47.1 | 14.7 |

There is less teacher mobility across school poverty levels, however. Among new teachers who changed schools between 2010-11 and 2011-12, 90 percent of those in low-poverty schools moved to another low-poverty school or to a school with moderate poverty levels. Similarly, among new teachers in high-poverty schools, 92 percent moved to another high-poverty school or moved to a moderate-poverty school. And among teachers in moderate-poverty schools, a larger share moved to a high-poverty school the following year than a low-poverty school, which may in part reflect a greater number of job openings available at high-poverty schools.

## Table 4.2: Distribution of 2010-11 First-Year Teachers who Changed Schools, by the 2011-12 School’s Poverty Level

|  |  |
| --- | --- |
| **2011 School Poverty Level** | **2012 School Poverty Level** |
| **Low Poverty** | **Moderate Poverty** | **High Poverty** |
| **Low Poverty** | 50.6 | 40.2 | 9.2 |
| **Moderate Poverty** | 18.6 | 70.1 | 11.3 |
| **High Poverty** | 8 | 22.8 | 69.2 |

# Lessons for Massachusetts & Directions for Future Research

We draw several lessons from the data in this report, but there is still much to learn about the distribution, effectiveness, and retention of educators in Massachusetts. Additional analyses of this data can better inform policies and programs that impact Massachusetts educators and the students they teach. Below, we outline key lessons for policymakers and educators and a research agenda that will provide even greater insight into the teacher workforce in Massachusetts.

## Routes to Teaching

Forty percent of the 4,734 teacher preparation program completers in the 2011-2012 school year were not hired in the state, yet a quarter of first-year teachers in Massachusetts hold a preliminary license and 629 waivers were issued for teachers teaching without the proper license. Given that the average distance from a teacher’s preparation program to his or her first job is just 21 miles, closer partnerships between preparation programs and neighboring districts can help increase employment rates and fill positions in shortage areas. This may also improve the effectiveness of first-year teachers by more closely tying teachers’ preparation to the needs of the districts in which they work.

* Additional research should assess the impact on student achievement of having a teacher with a preliminary license versus having a teacher with an initial license. This will help to determine whether the sizeable population of new teachers with a preliminary license makes a difference in student performance.
* Further analysis may examine the reasons why teacher shortages exist to determine if it is due to a lack of supply in certain geographic areas, teacher preference for certain subjects, or more attractive job opportunities outside the teaching profession.

## Students Taught by First-Year Teachers

High-poverty schools and Level 4 schools hire a disproportionately large share of first-year teachers. First-year teachers are also more likely to be assigned students who enter their classroom academically behind. And yet, on average, students taught by first-year teachers see lower academic growth than students taught by more experienced teachers. While the quality of new teachers can vary greatly, the state should ensure that students with the highest need have access to teachers with adequate preparation and experience to help them succeed academically.

* Future work in this area should explore the extent to which lower-performing students are consistently assigned to first-year teachers year after year and the effects of having multiple first-year teachers on student achievement.
* Researchers should explore the types of support and mentorship provided to first-year teachers and its effect on the academic growth of their students.

## Retention Rates of First-Year Teachers

First-year teacher retention rates are consistently lower than experienced teacher retention rates. However, the higher turnover among teachers with low median student growth scores indicates that principals may be differentiating among teachers in retention and/or that less effective teachers are selecting out of the profession. Still, high turnover can disrupt the functioning of learning communities and be detrimental to student achievement, particularly for schools with lower academic achievement.

* Researchers can seek to understand why teachers leave the profession and why they leave Level 4 and high poverty schools at a higher rate than other schools.
* Future research should include teacher evaluation ratings in addition to growth scores to assess the effectiveness of teachers who leave versus those who remain in teaching.

## Charter Schools

There are considerable differences in the student growth of new teachers in charter schools, compared with non-charter public schools. Therefore, the state should look to charter schools for lessons on increasing the effectiveness of first-year teachers.

* Researchers may explore the types of support and training charter schools implement for teachers and academic supports provided to students, both of which may impact the relatively high median SGP of new teachers.
1. We report a head count of all individuals in the EPIMS database, regardless of FTE hours. ESE’s School and District Profiles report employee FTEs, therefore the numbers in this report will differ slightly from ESE Profiles data. [↑](#footnote-ref-1)
2. 2 For more information about the EPIMS data collection and variables, please see: <http://www.doe.mass.edu/infoservices/data/epims/>. [↑](#footnote-ref-2)
3. Teachers are required to work three years before they can obtain a professional license, therefore if a teacher has a professional license we assume they cannot be a new teacher. [↑](#footnote-ref-3)
4. Kowalski, T., McCord, R., Peterson, G., Young, P., & Ellerson, N. M. (2011). *The American school superintendent: 2010 Decennial study*. Alexandria, VA: American Association of School Administrators. [↑](#footnote-ref-4)
5. We provide data only for Level 1 through Level 4 schools because no schools were designated as Level 5 by the end of the 2012-13 school year. ESE 2013 Accountability report: <http://profiles.doe.mass.edu/state_report/accountability.aspx> [↑](#footnote-ref-5)
6. *Characteristics of Public School Districts in the United States: Results from the 2007-08 Schools and Staffing Survey* (2009),Washington, D.C.: National Center for Education Statistics. [↑](#footnote-ref-6)
7. Massachusetts Department of Elementary and Secondary Education, “Educator License Waivers—Superior Court Decision,” December 19, 2011, Department of Elementary and Secondary Education website, <http://www.doe.mass.edu/news/news.aspx?id=6596>. [↑](#footnote-ref-7)
8. U.S. Department of Education, “Massachusetts Title II Reports”, October 2012, Title II Higher Education Act website, <https://title2.ed.gov/Public/Report/StateHome.aspx>; Massachusetts Department of Elementary and Secondary Education, “2011-12 Ed Prep Program Completers,” School/District Profiles website, <http://profiles.doe.mass.edu/state_report/epppprogramcompleters.aspx>. [↑](#footnote-ref-8)
9. The Performance Review Program for Initial Licensure is available to teachers with a preliminary license who are currently working as a teacher of record and have been employed for at least three full years under the preliminary license. These teachers can earn their initial license by meeting several requirements, including a recommendation from their principal and documentation of courses and experiences that address the Professional Standards for Teachers. For more information, see Regulations section 7.05: http://www.doe.mass.edu/lawsregs/603cmr7.html?section=05. [↑](#footnote-ref-9)
10. *Preparing and Credentialing the Nation’s Teachers* (2013), Washington, D.C.: U.S. Department of Education. [↑](#footnote-ref-10)
11. Miles are calculated in a straight line from the preparation program to the first employing school. [↑](#footnote-ref-11)
12. Boyd, D., Lankford, H., Loeb, S., and Wyckoff, J. “The Draw of Home: How Teachers’ Preferences for Proximity Disadvantage Urban Schools”, *Journal of Policy Analysis and Management* 24(1) (2009): 113-132. [↑](#footnote-ref-12)
13. For more information on SGP’s, see the ESE MCAS Student Growth Percentiles: Interpretive Guide <http://www.doe.mass.edu/mcas/growth/InterpretiveGuide.pdf> [↑](#footnote-ref-13)
14. Rivkin, S.G., Hanushek, E.A. & Kaine, J.F. “Teachers, Schools and Academic Achievement,” *Econometrica*, 73(2) (2005): 417-458 [↑](#footnote-ref-14)
15. “Do Low-Performing Students Get Placed with Novice Teachers?,” (Cambridge, MA: Strategic Data Project, 2012). [↑](#footnote-ref-15)
16. Carolyn J. Hill, Howard S. Bloom, Alison Rebeck Black, and Mark W. Lipsey; “Empirical Benchmarks for Interpreting Effect Sizes in Research,” Child Development Perspectives, Vol 2(3), (2008): 172-177. [↑](#footnote-ref-16)
17. Kaiser, A. and Cross, F., “Beginning Teacher Attrition and Mobility”, (Washington, D.C.: National Center for Education Statistics, 2011). [↑](#footnote-ref-17)
18. Ronfeldt, M., Loeb, S. & Wyckoff, J.,“How Teacher Turnover Harms Student Achievement,” *American Educational Research Journal* 50(1) (2013), 4-36. [↑](#footnote-ref-18)
19. Goldhaber, D., Gross, B., & Player, D. “Teacher Career Paths, Teacher Quality, and Persistence in the Classroom: Are Public Schools Keeping Their Best?” (Seattle, WA: Center for Education Data and Research, 2010). [↑](#footnote-ref-19)
20. Goldhaber, D., Gross, B., & Player, D. “Teacher Career Paths, Teacher Quality, and Persistence in the Classroom: Are Public Schools Keeping Their Best?” (Seattle, WA: Center for Education Data and Research, 2010). [↑](#footnote-ref-20)
21. Goldhaber, D., Gross, B. & Player, D. “Teacher Career Paths, Teacher Quality, and Persistence in the Classroom: Are Public Schools Keeping their Best?” (Seattle, WA: Center for Education Data and Research, 2010). [↑](#footnote-ref-21)